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Dr Engelmann

ENGINEER DEPARTMENT, U. S. ARMY.

GEOGRAPHICAL AND GEOLOGICAL EXPLORATIONS AND SURVEYS
WEST OF THE ONE HUNDREDTH MERIDIAN.

FIRST LIEUT. GEO. M. WHEELER, CORPS OF ENGINEERS, IN CHARGE.

Watson

CATALOGUE OF PLANTS

COLLECTED IN

Nevada, Ariz. & Utah.

THE YEARS 1871, 1872, AND 1873,

WITH

DESCRIPTIONS OF NEW SPECIES.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
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OFFICE OF THE CHIEF OF ENGINEERS,
Washington, D. C., June 27, 1874.

SIR: Lieut. George M. Wheeler has sent to this office the reports of Mr. Sereno Watson, and Dr. J. T. Rothrock, acting assistant surgeon United States Army, upon the botanical collections made in the years 1871, 1872, and 1873, in the surveying expedition under his charge.

I have respectfully to recommend that they be printed at the Government Printing-Office, and that 1,500 copies be furnished on requisition from this office.

Very respectfully, your obedient servant,

A. A. HUMPHREYS,
Brigadier-General and Chief of Engineers.

Hon. WM. W. BELKNAP,
Secretary of War.

Approved, by order of the Secretary of War:

H. T. CROSBY, *Chief Clerk.*

JULY 1, 1874.

UNITED STATES ENGINEER OFFICE,
EXPLORATIONS AND SURVEYS WEST OF THE 100TH MERIDIAN,
Washington, D. C., June 8, 1874.

SIR: I have the honor to forward herewith reports upon portions of the botanical collections made in the years 1871, 1872, and 1873, by Mr. Sereno Watson, and Dr. J. T. Rothrock, acting assistant surgeon United States Army, and suggest the propriety of their separate publication.

The manuscript material already gathered for the natural-history volume of the survey reports is so voluminous that the parts referring alone to the collections of animals, birds, insects, &c., will occupy more than 400 quarto pages.

The interest evinced by the numerous requests received for the reports upon the various subjects intrusted to the survey for examination leads to this request.

Very respectfully, your obedient servant,

GEO. M. WHEELER,
First Lieutenant Corps of Engineers, in charge.

Brig. Gen. A. A. HUMPHREYS,
Chief of Engineers.

ERRATA.

Page 19, 2d line from bottom, for Fumaria hygrometrica, read Funaria, &c.
Page 23, 1st line, for June 12, 1874, read June 12, 1873.
Page 37, bottom line, for S. serphyllifolia, read S. Serpyllifolia.
Page 38, 22d line from top, for Parnassia parvifolia, read Parnassia parviflora.
Page 48, 5th line from bottom, capital W for Wolfii.
Page 53, 4th line from top, for C. albolutesceus, read C. albolutrescens.
Page 58, 14th line from top, capital S for Lycopodium Selago.
Page 59, 26th line from top, for Orthotrichum tennelum, read Orthotrichum tenellum.

BOTANY.

LIST OF PLANTS COLLECTED IN NEVADA, ARIZONA, AND UTAH, UPON LIEUT. G. M. WHEELER'S SURVEY IN 1871 AND 1872.

INTRODUCTION.

The following report by Mr. Sereno Watson is upon the collections made in the field-seasons of 1871 and 1872, by the collectors of Lieut. George M. Wheeler's geographical and geological survey, west of the one-hundredth meridian.

Among those who were most active in collecting may be named Drs. H. C. Yarrow, W. S. Hoffman, and Oscar Loew, Messrs. Henshaw, Bischoff, and Francis Klett, and others.

This and the report of Dr. Rothrock are intended simply to be preliminary to the more full and complete reports.

The name of Mr. Watson is a sufficient guarantee for the accuracy of the work intrusted to him.

BOTANICAL REPORT.

BY SERENO WATSON.

CLEMATIS LIGUSTICIFOLIA, Nutt. Nevada, Utah, and Arizona.

THALICTRUM FENDLERI, Engelm. Nevada and Utah.

THALICTRUM OCCIDENTALE, Gray (?), *Proc. Amer. Acad.* 8. 372. Staminate specimens were collected in the Wahsatch Mountains near Provo City that may belong to this species. The foliage and habit are the same as in the Oregon plants; panicle leafy; anthers long-mucronate, as in *T. Fendleri.*

RANUNCULUS ANDERSONII, Gray. Belmont, Nevada.

RANUNCULUS CYMBALARIA, Pursh. Utah.

AQUILEGIA CANADENSIS, L. In the Southern Wahsatch. With the short sepals of the eastern plant and with much more dissected and smaller leaflets than the next.

AQUILEGIA FORMOSA, Fisch. (*A. Canadensis*, var. *formosa*, Torr.) Distinguishable from the last by its elongated sepals, nearly or quite equaling the spurs, and by its stouter habit, growing only on stream-banks in the mountains and flowering from July to September. Nevada and Utah; ranging from the Rocky Mountains to Oregon and Sitka, but not found in California.

AQUILEGIA CÆRULEA, James. Near Provo City, Utah. A reduced form of this species, with bright blue flowers, was collected at Kanab in Southern Utah, by Mrs. E. P. Thompson, in 1872. It has also recently been found in the Sierras near Mount Whitney.

AQUILEGIA CHRYSANTHA, Gray, *Proc. Amer. Acad.* 8. 621. This plant differs from *A. cærulea* in its pure yellow flowers with narrower sepals, in its stouter and more branched habit, and in its much longer continuance in flower, blooming freely until September. Arizona.

Mo. Bot. Garden

DELPHINIUM MENZIESII, DC. Nevada.
DELPHINIUM ELATUM, L., var. (?) OCCIDENTALE, Watson. Utah.
ACONITUM FISCHERI, Reich. (*A. nasutum*, Fisch.) Utah. A small specimen was collected in Southern Nevada with an unusually narrowed galea and long-projecting beak.
PÆONIA BROWNII, Dougl. Nevada.
BERBERIS REPENS, Lindl. Arizona and Utah.
BERBERIS FREMONTII, Torr. Arizona.
ARGEMONE HISPIDA, Gray. Utah.
CHEIRANTHUS MENZIESII, Benth. & Hook. Carlin, Nevada.
NASTURTIUM OFFICINALE, R. Br. Nevada and Utah.
NASTURTIUM SINUATUM, Nutt. Nevada.
ARABIS RETROFRACTA, Grah. Nevada.
PHYSARIA DIDYMOCARPA, Gray. Nevada and Utah.
SISYMBRIUM CANESCENS, Nutt. Nevada.
SISYMBRIUM INCISUM, Engelm. (*S. Californicum*, Watson, *King's Reports*, 5. 23.) Nevada and Utah.
ERYSIMUM ASPERUM, DC. Nevada and Utah.
STANLEYA PINNATIFIDA, Nutt. Nevada and Arizona.
THELYPODIUM INTEGRIFOLIUM, Nutt. Nevada and Utah.
THELYPODIUM SAGITTATUM, Endl. Carlin, Nevada.
CAULANTHUS CRASSICAULIS, Watson. (*Streptanthus*, Torr.) Nevada.
BRASSICA NIGRA, Benth. & Hook. Utah.
TROPIDOCARPUM GRACILE, Hook. San Francisco Mountains, Arizona.
LEPIDIUM NANUM, Watson, *King's Rep.* 5. 30, *t.* 4. Halleck Station, Nevada.
CLEOME LUTEA, Hook. Nevada.
CLEOME INTEGRIFOLIA, Torr. & Gray. Utah.
CLEOMELLA PARVIFLORA, Gray. Nevada.
CLEOMELLA OBTUSIFOLIA, Torr., *Fremont's Rep.* 311. Nevada.
VIOLA NUTTALLII, Pursh. Nevada.
VIOLA CANINA, L. Nevada.
KRAMERIA PARVIFOLIA, Benth. Southern Nevada.
FRANKENIA GRANDIFOLIA, Cham. & Schlecht. Nearly glabrous, with some stiff hairs upon the stipules and traces of pubescence upon the stem and capsules. The leaves are intermediate between the ordinary form of California, with mostly obovate leaves, and those of the recently described species (*F. Jamesii*, Torr.; Gray in *Proc. Amer. Acad.* 8. 622) of Colorado and Texas. Southern Nevada.
SAPONARIA VACCARIA, Host. Utah.
SILENE ACAULIS, L. Utah.
STELLARIA JAMESII, Torr. Nevada and Utah.
STELLARIA CRASSIFOLIA, Ehrh. Nevada.
ARENARIA FORMOSA, Fisch. Utah.
ARENARIA FENDLERI, Gray, var. SUBCONGESTA, Watson. Utah.
CLAYTONIA CAROLINIANA, Michx., var. SESSILIFOLIA, Torr. (*C. lanceolata*, Pursh.) Nevada.
LEWISIA REDIVIVA, Pursh. Nevada.
HYPERICUM SCOULERI, Hook. Utah.
FOUQUIERA SPLENDENS, Engelm. Gray, *Pl. Wright.* 1. 76. San Francisco Mountains, Arizona.
SIDALCEA MALVÆFLORA, Gray. Nevada and Utah.
MALVASTRUM COCCINEUM, Gray, and var. DISSECTUM, Gray. Utah.
MALVASTRUM MUNROANUM, Gray. Mineral Hill, Nevada.
SPHÆRALCEA EMORYI, Torr. Nevada.

SPHÆRALCEA INCANA, Torr., var. FENDLERI. (*S. Fendleri*, Gray.) San Francisco Mountains, Arizona, and Utah.
SPHÆRALCEA ACERIFOLIA, Nutt. Utah.
SIDA HEDERACEA, Torr. Utah.
LINUM PERENNE, L. Nevada and Utah.
LARREA MEXICANA, Moric. Southern Nevada and Arizona.
ERODIUM CICUTARIUM, L'Her. Nevada and Utah.
GERANIUM RICHARDSONII, Fisch. & Mey. Nevada and Utah.
GERANIUM CÆSPITOSUM, James. Utah.
PACHYSTIMA MYRSINITES, Raf. Utah.
KARWINSKYA HUMBOLDTIANA, Zucc. Gray, *Pl. Wright.* 1. 32. (*Rhamnus*, HBK.) Arizona.
CEANOTHUS FENDLERI, Gray, *Pl. Fendl.* 29. San Francisco Mountains. Arizona.
RHAMNUS CROCEUS, Nutt. Arizona.
VITIS ÆSTIVALIS, Michx., var. (?) Resembling a common Texan and New Mexican form; perhaps *V. Arizonica*, Engelm. Arizona.
ACER GRANDIDENTATUM, Nutt. Utah.
NEGUNDO ACEROIDES, Mœnch. Arizona and Utah.
RHUS GLABRA, L. Utah.
RHUS AROMATICA, Ait., var. TRILOBATA, Gray. Utah.
RHUS INTEGRIFOLIA, Benth. & Hook. (*Styphonia*, Nutt.) Arizona.
THERMOPSIS FABACEA, DC., var. MONTANA, Gray. Nevada.
LUPINUS PARVIFLORUS, Nutt. Wahsatch Mountains, Utah.
LUPINUS LEUCOPHYLLUS, Lindl. Utah.
LUPINUS LAXIFLORUS, Dougl. Utah.
LUPINUS HOLOSERICEUS, Nutt. Nevada and Utah.
LUPINUS SITGREAVII. Watson, Proc. Am. Acad. 8. 527. New species. Perennial, herbaceous, tall, branched, puberulent and more or less silky-villous, leafy; stipules setaceous; leaflets 7–9, glabrous above, oblanceolate, 1–3 inches long, acute, about equaling the petioles; raceme short-peduncled; flowers large, subverticillate; bracts shorter than the calyx, deciduous; upper calyx-lip short and rather broad, shortly toothed or nearly entire; petals apparently blue or purple, 5 lines long, the banner rounded, naked, keel ciliate; ovules 5.—San Francisco Mountains, Arizona; also collected in the same locality by Lieutenant Sitgreave in 1851. Brewer's 2012, from Ebbett's Pass in the Sierras, and 1020 Wright, from the Copper-Mine Mountains in New Mexico, differ but slightly.
MELILOTUS ALBA, Lam. Utah.
TRIFOLIUM MONANTHUM, Gray, *Proc. Amer. Acad.* 6. 523. Nevada.
TRIFOLIUM MEGACEPHALUM, Nutt. Diamond Range, Nevada.
HOSACKIA PURSHIANA, Benth. Nevada.
DALEA FREMONTII, Torr. Southern Nevada.
ASTRAGALUS DIPHYSUS, Gray. Nevada.
ASTRAGALUS LENTIGINOSUS, Dougl., and var. FREMONTII, Watson. Nevada.
ASTRAGALUS CANADENSIS, L. Utah.
ASTRAGALUS SHORTIANUS, Gray (?). Nevada and Utah. In flower only.
ASTRAGALUS UTAHENSIS, Torr. Utah.
ASTRAGALUS CYRTOIDES, Gray. Nevada.
ASTRAGALUS. MULTIFLORUS, Gray. Nevada. Other species were in the collection, but the specimens were too imperfect for determination.
GLYCYRRHIZA LEPIDOTA, Nutt. Nevada and Utah.
HEDYSARUM MACKENZII, Rich. Utah.

VICIA AMERICANA, Muhl. Nevada and Utah.
LATHYRUS LINEARIS, Nutt. San Francisco Mountains, Arizona.
LATHYRUS PALUSTRIS, L. Utah.
LATHYRUS POLYMORPHUS, Nutt. Arizona.
LATHYRUS VENOSUS, Muhl.
INDIGOFERA LEPTOSEPALA, Nutt. Arizona.
PARKINSONIA MICROPHYLLA, Torr., *Bot. Mex. Bound.* 59. Arizona.
CASSIA COVESII, Gray, *Amer. Jour. Sci.* 3. 3. 377. Sub-shrubby at base, 2° high, hoary with a short tomentum; stipules setaceous, 1–3 lines long; leaflets 2–3 pairs, obovate-oblong, ½–1 inch long, setaceously mucronate, with a short gland (about ½ line long) between each pair; racemes 5–7-flowered, the peduncles exceeding the leaves; sepals nearly equal, 2½ lines long, oblong, obtuse, subvillous, obscurely 3-nerved; petals bright yellow, 5–6 lines long, cuneate-obovate, distinctly unguiculate; pod 1 inch long, subcompressed, slightly falcate, submembranous, 2-valved, pubescent; seeds horizontal, about 30.—Northern Arizona; collected previously by Dr. Palmer in Southern Arizona, 1867. Near *C. crotalarioides*, Kunth, but less villous, with fewer leaflets, much smaller glands between each pair of leaflets, much smaller stipules, a shorter calyx in proportion to the petals, and a rather longer pod. The only means for comparison, however, has been the figure in Kunth's "*Mimoses.*"
PROSOPIS GLANDULOSA, Torr. Ash Meadows, Southern Nevada.
PROSOPIS PUBESCENS, Benth. Same locality.
MIMOSA BOREALIS, Gray, *Pl. Fendl.* 39. Arizona.
MIMOSA BIUNCIFERA, Benth., *Hook. Jour. Bot.* 4. 409. Arizona.
ACACIA CUSPIDATA, Schlecht., *Linnæa*, 12. 513. (*A. Texensis*, Torr. & Gray, *Flora*, 1. 404.) Arizona.
PRUNUS DEMISSA, Nutt. Nevada and Utah.
RUBUS NUTKANUS, Moç. Utah.
RUBUS STRIGOSUS, Michx. Utah.
PURSHIA TRIDENTATA, Nutt. Nevada and Arizona.
SPIRÆA MILLEFOLIUM, Torr., *Pac. Railroad Rep.* 4. 83, *t.* 5. Southern Nevada.
SPIRÆA CÆSPITOSA, Nutt. Utah.
CERCOCARPUS LEDIFOLIUS, Nutt. Nevada and Utah.
COWANIA MEXICANA, Don. Nevada and Arizona.
GEUM MACROPHYLLUM, Willd. Utah.
GEUM ROSSII, Ser. Utah.
FRAGARIA VIRGINIANA, Ehrh., var. GLAUCA, Watson.
ROSA BLANDA, Ait. Utah.
ROSA CALIFORNICA, Cham. & Schlecht. Gray, *Proc. Am. Acad.* 8. 382. (*R. blanda*, Watson, in *King's Rep.*) Nevada and Utah.
POTENTILLA FRUTICOSA, L.; also var. ALPINA; low and compact, the leaves very short (2 lines long), linear and revolute; the same as 342 Watson. Utah.
POTENTILLA ANSERINA, L. Utah.
POTENTILLA GLANDULOSA, Lindl. Utah.
POTENTILLA PENNSYLVANICA, L. Utah.
POTENTILLA GRACILIS, Dougl., and var. RIGIDA. (*P. rigida*, Nutt. *P. Nuttallii*, Lehm.) Utah.
AMELANCHIER ALNIFOLIA, Nutt. Nevada.
SAXIFRAGA PUNCTATA, L. Utah.
RIBES CEREUM, Dougl. Nevada.
RIBES LEPTANTHUM, Gray. Utah.
RIBES VISCOSISSIMUM, Pursh. Utah.

RIBES AUREUM, Pursh. Northern Nevada.
LYTHRUM ALATUM, L., var. LANCEOLATUM, Torr. & Gray. Nevada.
ZAUSCHNERIA CALIFORNICA, Presl. Arizona.
EPILOBIUM ANGUSTIFOLIUM, L. Utah.
EPILOBIUM TETRAGONUM, L. Nevada and Utah.
EPILOBIUM PANICULATUM, Nutt. Utah.
GAYOPHYTUM RAMOSISSIMUM, Torr. & Gray. Nevada.
GAYOPHYTUM RACEMOSUM, Torr. & Gray. Utah.
ŒNOTHERA BIENNIS, L., Utah; and var. GRANDIFLORA, Torr. & Gray. Nevada.
ŒNOTHERA HETERANTHA, Nutt. Utah.
ŒNOTHERA SCAPOIDEA, Nutt., var. PURPURASCENS, Watson, *Proc. Amer. Acad.* 8. 595. Nevada.
ŒNOTHERA ALBICAULIS, Nutt. Utah.
ŒNOTHERA GREGGII, Gray, *Pl. Fendl.* 46. Arizona.
ŒNOTHERA TANACETIFOLIA, Torr. & Gray. Nevada.
ŒNOTHERA BOOTHII, Dougl. Nevada.
ŒNOTHERA ALYSSOIDES, Hook. & Arn. Utah.
GAURA PARVIFLORA, Dougl. Utah.
GAURA SUFFULTA, Engelm., *Pl. Lindh.* 190. Arizona.
GAURA COCCINEA, Nutt. Nevada and Arizona.
MENTZELIA ALBICAULIS, Dougl. Nevada.
MENTZELIA LÆVICAULIS, Torr. & Gray. Utah.
PETALONYX THURBERI, Gray. Southern Nevada.
PETALONYX NITIDUS, Watson, *Amer. Naturalist*, 7. 300. New species. Leaves ovate, ½–1 inch long, acute, coarsely-toothed, shortly-petioled, vitreous and shining, not greatly reduced on the branches; flowers in contracted cymose panicles; otherwise like *P. Thurberi*.—Southern Nevada.
CUCURBITA DIGITATA, Gray, *Pl. Wright.* 2. 60. Arizona.
MAMILLARIA ARIZONICA, Engelm., ined. Arizona.
MAMILLARIA VIVIPARA, Haw., var. Arizona and Utah.
ECHINOCACTUS POLYCEPHALUS, Engelm. & Big. Arizona.
ECHINOCACTUS WISLIZENI, Engelm., *Pac. Railroad Rep.* 4. 30, *t.* 3. Arizona.
CEREUS VIRIDIFLORUS, Engelm. Nevada.
CEREUS ENGELMANNI, Parry. Arizona.
OPUNTIA BASILARIS, Engelm. & Big. Arizona.
OPUNTIA BIGELOVII, Engelm., *Pac. Railroad Rep.* 4. 50, *t.* 19. Arizona.
OPUNTIA ARBORESCENS, Engelm. Arizona.
OPUNTIA TESSELATA, Engelm., *Pac. Railroad Rep.* 4. 52, *t.* 21. Arizona.
CICUTA MACULATA, L. Nevada and Utah.
CARUM GAIRDNERI, Benth. & Hook. Nevada.
SIUM ANGUSTIFOLIUM, L. Nevada and Utah.
ANGELICA WHEELERI, Watson, *Amer. Naturalist*, 7. 301. New species. Tall and stout, roughly puberulent; leaves biternate; leaflets ovate-oblong, 2–3 inches long, acute, incisely serrate, the teeth broad and mucronate, middle leaflet petiolulate; umbels naked; rays numerous, unequal, becoming 2–5 inches long; pedicels and ovary hispid; petals apparently white; fruit broad-elliptical, 3 lines long, subpubescent, the dorsal wings thick, narrower than the lateral ones.—Utah.
FERULA MULTIFIDA, Gray (?). Foliage only. Utah.
PEUCEDANUM SATIVUM, Benth. & Hook. Utah.
GARRYA FLAVESCENS, Watson, *Amer. Naturalist*, 7. 301. (*Garrya*—(?), Watson, *King's Rep.* 5. 421.) Silky pubescent with straight appressed hairs; leaves yellowish, elliptic-oblong, acute at each end,

1–2½ inches long, glabrate above, entire, revolute on the margin; petioles 3–6 lines long; aments pendulous, the bracts broad-ovate, connate, foliaceous, acute or the lower ones acuminate, 6–10 pairs; sterile aments rather loose, 1–2 inches long, the flowers 1–3, on pedicels equaling or exceeding the ample bracts; fertile aments crowded, 1 inch long, with solitary flowers and densely pubescent fruit.—From Southern Nevada and Utah to Arizona and New Mexico; growing 5–8 feet high.

CORNUS PUBESCENS, Nutt. Utah. This is *C. Californica*, C. A. Meyer, but Nuttall's name is the older and unappropriated.

SYMPHORICARPUS ROTUNDIFOLIUS, Gray, *Pl. Wright.* 2. 66; *Jour. Linn. Soc.* 14. 11. Nevada.

SAMBUCUS GLAUCA, Nutt. Utah.

GALIUM BOREALE, L. Utah.

VALERIANA EDULIS, Nutt. Utah.

PLECTRITIS CONGESTA, DC. Nevada.

PECTIS PAPPOSA, Harv. & Gray, *Pl. Fendl.* 62. Arizona.

BRICKELLIA CALIFORNICA, DC. Nevada and Utah.

BRICKELLIA (CLAVIGERA) LONGIFOLIA, Watson, *Amer. Naturalist*, 7. 301. New species. Very slender, with spreading branches; glabrous, with a slight scabrousness; leaves linear, acuminate, 2–5 inches long, flat, entire or obscurely sinuate-toothed, rough-margined, 3 nerved, punctulate; flowers on short slender pedicels, axillary and in small loose terminal clusters; involucre glabrous, 2 lines long, the scales acutish, or the inner linear ones obtuse or truncate, spreading; achenium 10-striate, slightly and minutely hairy on the angles, nearly 1 line long; pappus soft, minutely barbulate, but little longer than the achenium.—Southern Nevada. Also collected at Kanab, Southern Utah, by Mrs. E. P. Thompson.

EUPATORIUM PURPUREUM, L. Utah.

EUPATORIUM BERLANDIERI, DC., *Prodr.* 5. 167. Gray, *Bot. Mex. Bound.* 76. San Francisco Mountains, Arizona.

ASTER ADSCENDENS, Lindl. Utah.

ASTER SIMPLEX, Willd. Nevada.

ASTER MULTIFLORUS, L., var. Utah.

ASTER FALCATUS, Lindl. San Francisco Mountains, Arizona.

ASTER GLACIALIS, Nutt. Utah.

ASTER ENGELMANNI, Gray. Utah.

ASTER SPINOSUS, Benth. Torr. & Gray, *Flora*, 2. 165. Arizona.

MACHERANTHERA CANESCENS, Gray. Nevada, Arizona and Utah.

ERIGERON COMPOSITUS, Pursh, and var. DISCOIDEUS, Gray. Utah.

ERIGERON CÆSPITOSUS, Nutt. San Francisco Mountains, Arizona and Utah.

ERIGERON BELLIDIASTRUM, Nutt. Nevada and Arizona.

ERIGERON MACRANTHUS, Nutt. Utah.

TOWNSENDIA SCAPIGERA, Eaton. Nevada.

GUTIERREZIA EUTHAMIÆ, Torr. & Gray. Nevada, Arizona and Utah.

SOLIDAGO NEMORALIS, Ait., var. Nevada, Utah, and San Francisco Mountains, Arizona.

SOLIDAGO GUIRADONIS, Gray. Nevada.

SOLIDAGO PUMILA, Nutt. Nevada.

BIGELOVIA GRAVEOLENS, Gray, *Proc. Amer. Acad.* 8. 644. (*Linosyris*, Torr. & Gray.) Nevada, Arizona and Utah. Also var. ALBICAULIS, Gray, *l. c.* Nevada.

BIGELOVIA DOUGLASII, Gray, *l. c.* 645. (*Linosyris viscidiflora*, Torr. & Gray.) Also var. SERRULATA, Gray. Utah.

APLOPAPPUS GRACILIS, Gray, *Pl. Fendl.* 76, and var. DENUDATUS, Torr. Arizona.

APLOPAPPUS CERVINUS, Watson, *Amer. Naturalist*, 7. 301. New species. Low (6 inches high,) suffruticose, resinous-scabrous, the short herbaceous stems leafy to the top; leaves oblong-lanceolate, 4–6 lines long, shortly cuspidate, attenuate to the base, entire, subscabrous, 3-nerved; heads 3–4 lines long, in corymbs of 3–5, terminating the branches; outer involucral scales linear, acuminate, with setaceous spreading tips, the inner chartaceous, acutish, with scarious lacerated margins, erect, nearly equaling the pappus; rays few, narrow and but little exceeding the disk; style exserted; achenia linear, pubescent.—Nearest to *A. suffruticosus*, Gray. Antelope Cañon, Utah.

GRINDELIA SQUARROSA, Dunal. Utah.

CHRYSOPSIS VILLOSA, Nutt. Utah.

LAPHAMIA STANSBURII, Torr. Utah.

LAPHAMIA MEGALOCEPHALA, Watson, *Amer. Naturalist*, 7. 301. New species. Scabrous-pubescent; stems diffusely branched, a foot high; branches simple; leaves alternate, broadly ovate. 2–3 lines long, smaller upon the branches, entire, very shortly petioled; heads large, 2–3 lines in diameter, terminal and solitary, discoid, many-flowered; achenia compressed, hispid; pappus none.—With nearly the habit of the last. Nevada.

PERITYLE EMORYI, Torr., *Bot. Mex. Bound.* 82. Arizona.

BACCHARIS HALIMIFOLIA, L. Torr. & Gray, *Flora*, 2. 258. Nevada and Arizona.

BACCHARIS SALICINA, Torr. & Gray, *Flora*, 2. 258. Nevada.

BACCHARIS EMORYI, Gray, *Bot. Mex. Bound.* 83. Arizona.

TESSARIA BOREALIS, Torr. & Gray. Nevada.

PLUCHEA CAMPHORATA, DC. Torr. & Gray, *Flora*, 2. 261. Telescope Mountain, Southeastern California.

CONYZA COULTERI, Gray, *Proc. Amer. Acad* 7. 355. Arizona.

AMBROSIA PSILOSTACHYA, DC. Utah.

FRANSERIA DUMOSA, Gray. Arizona.

HYMENOCLEA MONOGYRA, Torr. & Gray. Arizona.

XANTHIUM STRUMARIUM, L. Utah.

OXYTENIA ACEROSA, Nutt., *Pl. Gambell.* 172. Telescope Mountain, California. A rediscovery.

ZINNIA GRANDIFLORA, Nutt. Torr. & Gray, *Flora*, 2. 298. Arizona.

HELIOMERIS MULTIFLORA, Nutt. Nevada, Arizona and Utah.

ENCELIA CALIFORNICA, Nutt. Torr. & Gray, *Flora*, 2. 317. Var. Tomentose, with a close white pubescence; flowers small. Arizona.

VIGUIERA RETICULATA, Watson, *Amer. Naturalist*, 7. 301. New species. White-tomentose; stems herbaceous; leaves subopposite, coriaceous and rigid, broad-ovate, 1–2 inches long, cordate at base, acute, entire, short-petioled, strongly reticulated beneath; bracts small, lanceolate; heads 4–5 together, in short close corymbs; involucral scales imbricated in 3–4 or more series, lanceolate, thick, appressed or the tips spreading; rays entire; receptacle shortly conical; chaff acutish; achenia silky pubescent, the pappus-awns subulate at base, the scales lacerate.—Telescope Mountain, Southeastern California.

WYETHIA AMPLEXICAULIS, Nutt. Utah.

BALSAMORHIZA SAGITTATA, Nutt. Northern Nevada and Utah.

RUDBECKIA OCCIDENTALIS, Nutt. Utah.

HELIANTHUS PETIOLARIS, Nutt. Torr. & Gray, *Flora*, 2. 319. Nevada.

HELIANTHUS LENTICULARIS, Dougl. Utah.

HELIANTHUS NUTTALLII, Torr. & Gray. Nevada.
HELIANTHUS GIGANTEUS, L., var. UTAHENSIS, Eaton. Utah.
RIDDELLIA COOPERI, Gray, *Proc. Amer. Acad.* 7. 358. Arizona.
HYMENOTHRIX WRIGHTII, Gray, *Pl. Wright.* 2. 97. Torrey, *Sitgreave's Rep.* 164, *t.* 6. Arizona.
HYMENOTHRIX WISLIZENI, Gray, *Pl. Fendl.* 102. Arizona.
PALAFOXIA LINEARIS, Lag. Arizona.
CHÆNACTIS DOUGLASII, Hook. & Arn. Nevada and Utah.
CHÆNACTIS STEVIOIDES, Hook. & Arn. Independence Valley, Nevada.
HYMENOPAPPUS LUTEUS, Nutt. Arizona.
BAHIA LEUCOPHYLLA, DC. Nevada.
HELENIUM AUTUMNALE, L. Utah.
LAYIA GLANDULOSA, Hook. & Arn. Nevada.
BAILEYA MULTIRADIATA, Harv. & Gray, *Pl. Fendl.* 105. Torrey, *Emory's Rep.* 144, *t.* 6. Nevada and Arizona.
ACHILLEA MILLEFOLIUM, L. Nevada, Arizona and Utah.
ARTEMISIA DRACUNCULOIDES, Pursh. Arizona and Utah.
ARTEMISIA LUDOVICIANA, Nutt., Arizona; and varieties LATILOBA, Nutt., LATIFOLIA, Torr. & Gray, and DOUGLASIANA, Eaton, in Utah.
GNAPHALIUM LUTEO-ALBUM, L., var. SPRENGELII, Eaton. Utah.
ANTENNARIA DIOICA, Gærtn., var. ROSEA, Eaton. Nevada.
ARNICA LATIFOLIA, Bong. Utah.
ARNICA LONGIFOLIA, Eaton. Utah.
SENECIO AUREUS, L., var. CROCEUS, Gray. Utah.
SENECIO TRIANGULARIS, Hook. Utah.
SENECIO LUGENS, Hook. Nevada.
SENECIO DOUGLASII, DC. Torr. & Gray, *Flora*, 2. 443. Glabrate form. San Francisco Mountains, Arizona.
TETRADYMIA CANESCENS, DC. Utah.
CIRSIUM UNDULATUM, Spreng. Nevada and Utah.
PEREZIA WRIGHTII, Gray, *Pl. Wright.* 1. 127. Arizona.
PEREZIA NANA, Gray, *Pl. Fendl.* 111. Arizona.
LYGODESMIA SPINOSA, Nutt. Utah.
CHÆTADELPHIA* WHEELERI, Gray MS. Watson, *Amer. Naturalist*, 7. 301. Stems numerous, flexuous, 1 foot high; leaves linear-lanceolate, 1–2 inches long, entire, acute, rather rigid; flowers apparently rose-color; involucre 6 lines long; achenia 3–4 lines long, the brownish pappus exceeding the involucre.—With the habit of *Lygodesmia juncea*, in which genus Bentham and Hooker are disposed to place it. Southern Nevada.
MALACOTHRIX SONCHOIDES, Torr. & Gray. Nevada and Utah.
CREPIS ACUMINATA, Nutt. Nevada.
CREPIS OCCIDENTALIS, Nutt., var. GRACILIS, Eaton. Nevada and Utah.
MACRORHYNCHUS TROXIMOIDES, Torr. & Gray. Nevada and Utah.
SONCHUS ASPER, Vill. Utah.
LOBELIA CARDINALIS, L., var. TEXENSIS. Leaves narrowly lanceolate; bracts small; calyx-teeth 2–3 lines long. Arizona.
ARCTOSTAPHYLOS GLAUCA, Lindl. (?) Nevada and Utah.
LYSIMACHIA CILIATA, L. Utah.

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* CHÆTADELPHIA, Gray. (New genus of *Cichoraceæ*.) Heads about 5-flowered. Involucre cylindrical, of 5 linear 1-nerved scales in a single row, calyculate with several small imbricate scales at base. Receptacle naked. Ligules short. Achenia linear, glabrous, pentagonal, somewhat striate between the angles, slightly thickened upward, truncate at each end. Pappus persistent, brownish, of 5 stout rigid minutely barbulate awns, each with 3–5 shorter unequal slender setæ more or less united to it at base. A smooth diffusely-branched herbaceous perennial, with alternate leaves and solitary terminal flowers.—WATSON, *l. c.* Gray, *Proc. Amer. Acad.* 9. 218.

DODECATHEON MEADIA, L. Nevada.
PHELIPÆA ERIANTHERA, Engelm. Utah.
CHILOPSIS LINEARIS, DC., *Prodr.* 9. 227. (*C. glutinosa*, Engelm, *Wisl. Rep.* 94.) Southern Nevada.
MARTYNIA PROBOSCIDEA, Glox. San Francisco Mountains, Arizona.
GESNERA (?) Foliage only, thick and fleshy, glabrous; leaves opposite, broad-cordate, undulate, crenate, strongly veined, papillose. No species of this genus has been recognized as growing north of Mexico.
DREJERA PUBERULA, Torr., *Bot. Mex. Bound.* 123. Arizona.
VERBASCUM THAPSUS, L. Utah.
ANTIRRHINUM MAURANDIOIDES, Gray, *Proc. Amer. Acad.* 7. 376. (*Maurandia antirrhiniflora*, Willd.) Arizona.
COLLINSIA PARVIFLORA, Dougl. Nevada.
PENTSTEMON EATONI, Gray, *Proc. Amer. Acad.* 8. 395. (*P. centranthifolius*, Watson, *King's Rep.* 5. 219, not Benth.) Belmont, Nevada; Utah.
PENTSTEMON GLABER, Pursh. Nevada and Utah.
PENTSTEMON FREMONTII, Torr. & Gray. Nevada and Utah.
PENTSTEMON WRIGHTII, Gray (?) Utah.
PENTSTEMON LINARIOIDES, Gray. Arizona.
PENTSTEMON GLAUCUS, Grah. Utah.
PENTSTEMON CONFERTUS, Dougl., var. CÆRULEO-PURPUREUS, Gray. Nevada and Utah.
PENTSTEMON DEUSTUS, Dougl. Nevada.
PENTSTEMON LÆTUS, Gray. Mineral Hill, Nevada.
MIMULUS LUTEUS, L. Nevada, Arizona and Utah.
MIMULUS CARDINALIS, Dougl., var. Low, with leaves attenuate to the base. Arizona.
MIMULUS PILOSUS, Watson. (*Herpestis*, Benth.) Nevada.
EUNANUS FREMONTII, Benth. Nevada.
EUNANUS BIGELOVII, Gray. Nevada.
CASTILLEIA LINARIÆFOLIA, Benth., and var. with lanceolate 3-nerved leaves, as in *C. laxa*. Nevada and Utah.
CASTILLEIA AFFINIS, H. & A., var. MINOR, Gray. Nevada and Utah.
CASTILLEIA PALLIDA, Kunth. Utah.
CASTILLEIA PARVIFLORA, Bong. Nevada.
CASTILLEIA INTEGRA, Gray. San Francisco Mountains, Arizona.
ORTHOCARPUS TOLMIEI, Hook. & Arn. Utah.
LIPPIA WRIGHTII, Gray, *Bot. Mex. Bound.* 126. Arizona.
VERBENA AUBLETIA, L. Arizona.
VERBENA HASTATA, L. Utah.
VERBENA BRACTEOSA, Michx. Utah.
MENTHA CANADENSIS, L. Utah.
LYCOPUS SINUATUS, Ell. Utah.
MONARDELLA ODORATISSIMA, Benth. Nevada and Utah.
AUDIBERTIA INCANA, Benth. Nevada.
NEPETA CATARIA, L. Utah.
LOPHANTHUS URTICÆFOLIUS, Benth. Utah.
DRACOCEPHALUM PARVIFLORUM, Nutt. Utah.
SCUTELLARIA ANTIRRHINOIDES, Benth. Gray, *Proc. Amer. Acad.* 8. 396. (*S. resinosa*, Watson, *King's Rep.* 5. 237, not Torr.) Nevada.
SALAZARIA MEXICANA, Torr. Arizona.
STACHYS ALBENS, Gray, *Proc. Amer. Acad.* 8. 387. Arizona.
ECHINOSPERMUM REDOWSKII, Lehm., var. OCCIDENTALE, Watson. Nevada.
LITHOSPERMUM PILOSUM, Nutt. Utah.

MERTENSIA SIBIRICA, Don. Utah.
COLDENIA HISPIDISSIMA, Gray. (*Eddya*, Torr.) Nevada.
COLDENIA PALMERI, Gray. Nevada.
HELIOTROPIUM CURASSAVICUM, L. Nevada.
HYDROPHYLLUM CAPITATUM, Dougl. Utah.
PHACELIA SERICEA, Gray. Nevada.
PHACELIA CRENULATA, Torr. Watson, *King's Rep.* 5. 251. Nevada.
ERIODYCTION GLUTINOSUM, Benth., var. ANGUSTIFOLIUM, Torr. (*E. angustifolium*, Nutt., *Pl. Gambel.* 181.) Southern Nevada.
PHLOX CÆSPITOSA, Nutt. Nevada and Utah.
PHLOX DOUGLASII, Hook. Nevada and Arizona.
PHLOX LONGIFOLIA, Nutt., Nevada; and var. STANSBURII, Gray, Nevada and Arizona.
COLLOMIA CAVANILLESIANA, Don. Arizona.
COLLOMIA LONGIFLORA, Gray. San Francisco Mountains, Arizona.
COLLOMIA LINEARIS, Nutt. Utah.
GILIA NUTTALLII, Gray. Nevada.
GILIA PUNGENS, Benth. Nevada.
GILIA (NAVARRETIA) DEBILIS, Watson, *Amer. Naturalist*, 7. 302. New species. Stems short and slender, 1–2 inches high, leafy above; pubescence minute or hirsute; leaves alternate, ½–1 inch long, oblong, attenuate into a short petiole, entire, or some of them broader and 3-lobed; bracts entire, resembling the leaves, twice longer than the calyx; flowers nearly sessile; calyx with ovate-triangular teeth, shorter than the tube; corolla funnelform, 8 lines long, with elongated tube and deeply-lobed limb, light-purple; stamens upon the throat, exserted; capsule 1 line long, the cells 1-seeded; seeds without mucilage or spiracles.—Southern Utah.
GILIA DENSIFOLIA, Benth. Nevada.
GILIA FILIFOLIA, Nutt., var. DIFFUSA, Gray. Nevada.
GILIA AGGREGATA, Spreng. Nevada, Arizona and Utah.
POLEMONIUM CONFERTUM, Gray. Belmont, Nevada; Utah.
POLEMONIUM CÆRULEUM, L., and var. FOLIOSISSIMUM, Gray. Utah.
POLEMONIUM HUMILE, Willd. Utah.
CONVOLVULUS LONGIPES, Watson, *Amer. Naturalist*, 7. 302. New species. Glabrous, glaucous, twining; leaves linear, 1 inch long or less, entire or auricled at base, petioled; peduncles elongated, 2–6 inches long, mostly strict, 2–3-bracted, usually 1-flowered; bracts linear; calyx-lobes rounded, obtuse, or emarginate; corolla funnelform, 1¼ inches long, yellowish.—Southern Nevada.
CRESSA CRETICA, L., var. TRUXILLENSIS, Chois. Arizona.
PHYSALIS VISCOSA, L. Utah.
PHYSALIS ——— (?) Near *P. pubescens*, but leaves small and mostly suborbicular; stems flexuous. Arizona.
LYCIUM ANDERSONII, Gray. Nevada and Arizona.
NICOTIANA ATTENUATA, Torr. Nevada and Utah.
ERYTHRÆA TRIACANTHA, Griseb., *DC. Prodr.* 9. 60. Arizona.
ERYTHRÆA NUTTALLII, Watson. Utah.
ERYTHRÆA CHIRONIOIDES, Torr., *Bot. Mex. Bound.* 156, *t.* 42. Arizona.
FRASERA SPECIOSA, Dougl. Nevada and Utah.
GENTIANA DETONSA, Fries. Utah.
GENTIANA AFFINIS, Gmel. Utah.
APOCYNUM CANNABINUM, L. Nevada.
APOCYNUM ANDROSÆMIFOLIUM, L. Utah.
ASCLEPIAS SPECIOSA, Torr. Nevada and Utah.
ASCLEPIAS VERTICILLATA, L. Nevada.

MENODORA SCABRA, Gray, *Amer. Jour. Sci.* 2. 14. 44. Torr., *Pac. Railroad Rep.* 7. 18, *t.* 7. Var. GLABRESCENS, Gray MS., in herb. Smooth; calyx-lobes 5–6, short, 1 line long or less, obtuse. Stamens occasionally three. Arizona.

FRAXINUS VIRIDIS, Michx. Arizona.

FRAXINUS ANOMALA, Torr. Arizona.

FRAXINUS CORIACEA, Watson, *Amer. Naturalist*, 7. 302. New species. Leaflets 1–2 pairs, coriaceous, obovate or oblong, 1–2 inches long, truncate or rounded at the apex or acutish, attenuate or abruptly contracted at base, sparingly toothed, mostly rather long petiolulate, glabrous, or, with the petioles, pubescent when young; fruit 1 inch long, terete at base, widening into an oblong obtuse wing; calyx persistent.—Ash Meadows, Nevada, and also collected by Dr. Bigelow on the Mexican boundary survey at Devil's Run Cañon, but not mentioned in the report. A stem of twelve years' growth, 1½ inches in diameter, has a smooth grayish brown bark.

MIRABILIS MULTIFLORA, Gray. Arizona.

OXYBAPHUS NYCTAGINEUS, Sw., var. OBLONGIFOLIUS, Gray. With small flowers and leaves. Nevada.

OXYBAPHUS ANGUSTIFOLIUS, Sw. Nevada and Arizona.

ALLIONIA INCARNATA, L. Southern Nevada and Arizona.

ABRONIA VILLOSA, Watson, *Amer. Naturalist*, 7. 302. New species. Covered throughout with a more or less dense villous subglandular spreading pubescence; stems weak and slender; leaves small, ¼–1 inch long, oblong or ovate, obtuse or acutish, attenuate into the slender petiole; heads 5–10-flowered; involucral scales narrowly lanceolate, long-acuminate, 3–4 lines long; flowers pink, the lobes obcordate, with a deep sinus; fruit with a firm body, strongly reticulate-pitted, the 3–5 broad wings, consisting of a simple lamina, usually truncate above.—Nearest to *A. umbellata*. Arizona.

BOERHAAVIA WRIGHTII, Gray, *Amer. Jour. Sci.* 2. 15. 322. Arizona.

CHENOPODIUM ALBUM, L. Utah.

CHENOPODIUM FREMONTII, Watson. Utah.

ATRIPLEX CANESCENS, James. (*Obione*, Moq.) Nevada.

ATRIPLEX CONFERTIFOLIA, Watson. (*Obione*, Torr.) Nevada and Utah.

ATRIPLEX HYMENELYTRA, Watson. (*Obione*, Torr.) Nevada.

KOCHIA AMERICANA, Watson, *Proc. Am. Acad.* 9. 93. Nevada.

SPIROSTACHYS OCCIDENTALIS, Watson, *l. c.* 9. 125. (*Halostachys*, Watson, *King's Rep.* 5. 293.) Nevada, Arizona and Utah.

SUÆDA DIFFUSA, Watson, *l. c.* 9. 88. (*S. maritima*, Watson, *King's Rep.* 5. 294.) Nevada and Utah.

SARCOBATUS VERMICULATUS, Torr. Utah.

AMBLOGYNE TORREYI, Gray, *Proc. Amer. Acad.* 5. 169. San Francisco Mountains, Arizona.

AMBLOGYNE FIMBRIATA, Gray, *Proc. Amer. Acad.* 5. 168. Nevada and Arizona.

AMARANTUS ALBUS, L. Arizona and Utah.

ALTERNANTHERA LANUGINOSA, Torr. Arizona.

NITROPHILA OCCIDENTALIS, Watson. (*Banalia*, Moq.) Nevada.

POLYGONUM PERSICARIA, L. Utah.

POLYGONUM AVICULARE, L. Utah.

POLYGONUM ERECTUM, L. Utah.

POLYGONUM AMPHIBIUM, L. Utah.

ERIOGONUM CÆSPITOSUM, Nutt. Halleck Station, Nevada, and Utah.

ERIOGONUM POLYANTHUM, Benth. Utah.

ERIOGONUM HERACLEOIDES, Nutt. Utah.
ERIOGONUM UMBELLATUM, Torr. Nevada and Utah.
ERIOGONUM OVALIFOLIUM, Nutt. Northern Nevada.
ERIOGONUM ELATUM, Dougl. Nevada.
ERIOGONUM FASCICULATUM, Benth., var. POLIFOLIUM, Torr. & Gray. Nevada.
ERIOGONUM CORYMBOSUM, Benth. Arizona. An elongated form.
ERIOGONUM MICROTHECUM, Nutt., Utah; and var. EFFUSUM, Torr. & Gray, Arizona; also a form between var. CONFERTIFLORUM, Torr. & Gray, and var. FENDLERIANUM, Benth., but with larger flowers than usual.
ERIOGONUM BREVICAULE, Nutt. Utah.
ERIOGONUM RACEMOSUM, Nutt. Nevada and Utah.
ERIOGONUM WRIGHTII, Torr. Arizona.
ERIOGONUM HEERMANNI, Dur. Nevada.
ERIOGONUM GRACILE, Benth., var. EFFUSUM, Torr. & Gray. Nevada.
ERIOGONUM DEFLEXUM, Torr. Arizona.
ERIOGONUM CERNUUM, Nutt., var. TENUE, Torr. & Gray. Nevada.
ERIOGONUM INFLATUM, Torr. Nevada and Arizona.
CHORIZANTHE RIGIDA, Torr. Nevada or Arizona.
COMANDRA UMBELLATA, Nutt. Nevada.
ARCEUTHOBIUM DIVARICATUM, Engelm., ined. The staminate plant only; the species is parasitic upon *Pinus edulis*. Utah.
PHORADENDRON FLAVESCENS, Nutt., var. VILLOSUM, Engelm., in Gray, *Pl. Lindh.* 212. Arizona.
PHORADENDRON CALIFORNICUM, Nutt. Engelm., *Pl. Lindh.* 213. Arizona.
PHORADENDRON JUNIPERINUM, Engelm., in Gray, *Pl. Fendl.* 58. Arizona.
ANEMOPSIS CALIFORNICA, Hook. Nevada.
EUPHORBIA SERPYLLIFOLIA, Pers. Utah.
EUPHORBIA GLYPTOSPERMA, Engelm. Utah.
EUPHORBIA ALBOMARGINATA, Torr. & Gray, *Pac. Railroad Rep.* 2. 174. Arizona.
EUPHORBIA FENDLERI, Torr. & Gray, *Pac. Railroad Rep.* 2. 175. Nevada.
EUPHORBIA ESULÆFORMIS, Schauer, *Linnæa*, 20. 729. Arizona.
EUPHORBIA MONTANA, Engelm. Nevada.
CELTIS RETICULATA, Torr., *Ann. N. Y. Lyc.* 2. 247. Nuttall, *Sylva*, 1. 133, *t.* 39. Arizona.
URTICA GRACILIS, Ait., var. OCCIDENTALIS. (*U. dioica*, var. Watson, *King's Rep.* 5. 321.) Utah.
HUMULUS LUPULUS, L. Utah.
PLATANUS RACEMOSA, Nutt. (?) Arizona.
QUERCUS UNDULATA, Torr., *Ann. N. Y. Lyc.* 2. 248, *t.* 4. Nuttall, *Sylva*, 1. 8, *t.* 3. (*Q. obtusiloba*, var. *depressa*, Nutt.; *Q. Fendleri*, Liebm.; *Q. Gambellii*, Nutt.; *Q. alba*, var. *Gunnisoni*, Torr.; *Q. obtusiloba (stellata)*, var. *Utahensis* and *Q. Douglasii*, var. *Neo-Mexicana*, A. DC.) Utah. The common low oak of the Rocky Mountains and Wahsatch, ranging southward to New Mexico and Southern Utah. It is quite variable in its foliage. The typical form has oblong leaves with acute or acutish entire divaricate mostly triangular lobes, the sinuses reaching half-way to the midrib. This is also *Q. Fendleri*, Liebm. With large leaves and the lobes sometimes coarsely notched, it becomes *Q. Gambellii*, Nutt., and *Q. Douglasii*, var. *Neo-Mexicana*, A. DC. With the lobes more obtuse, it is *Q. alba*, var. (?) *Gunnisoni*, Torr. With the lobes less divaricate and more oblong, frequently notched at the apex,

and the rounded or narrow sinuses reaching often nearly to the midrib, it is the more prevalent northern form, *Q. obtusiloba*, var. *depressa*, Nutt., and var. *Utahensis*, A. DC. The extreme forms appear quite distinct, but intermediate forms abound, and there seems to be nothing in the flowers or fruit to distinguish them.

QUERCUS EMORYI, Torr., *Emory's Rep.* 152, *t.* 9. (*Q. pungens*, Liebm.)

QUERCUS OBLONGIFOLIA, Torr., *Sitgreave's Rep.* 173, *t.* 19. (*Q. grisea*, Liebm.)

QUERCUS HASTATA, Liebm., *DC. Prodr.* 16. 2. 36. (? *Q. berberidifolia*, Liebm.) Numerous specimens from Southern Nevada and Northern Arizona, mostly without fruit, very variable in the characters of the foliage, seem to be referable to these three best-marked species of the oaks of that region. *Q. hastata* is most clearly distinguishable by the thin flattened obtusely rhomboidal and smoothish scales of the cup. The two former have more thickened convex scales, but are perhaps not distinct. The size, toothing and pubescence of the leaves are very variable.

BETULA OCCIDENTALIS, Hook. Northern Nevada and Utah.

ALNUS INCANA, Willd., var. GLAUCA, Ait. Arizona and Utah.

ALNUS OBLONGIFOLIA, Torr., *Bot. Mex. Bound.* 204. Arizona.

POPULUS MONILIFERA, Ait. Nevada.

POPULUS BALSAMIFERA, L., var. ANGUSTIFOLIA, Watson. Nevada and Utah.

POPULUS TREMULOIDES, Michx. San Francisco Mountains, Arizona.

SALIX LONGIFOLIA, Muhl. Nevada and Utah.

SALIX NEVADENSIS, Watson, *Amer. Naturalist*, 7. 302. New species. Aments short, 6–8 lines long, appearing with the leaves, ascending on leafy peduncles; scales oblong, obtuse, glabrous, or sub-silky in the male aments, light-colored; stamens 2, free; capsules glabrous even when young, on pedicels ½ line long; style none, stigmas short and thick; leaves lance-linear, ½–1 inch long on flowering specimens, acuminate, entire, silky tomentose; stipules very minute. —A slender shrub, 3–4° high, with light colored bark and yellowish foliage, growing in dry sandy soil. It differs from *S. Hindsiana* in its more reduced habit, its silvery pubescence, narrower, more scarious, lighter-colored and nearly glabrous scales, more slender and smoother capsules, and thicker and shorter stigmas. Central Nevada. Collected also by Watson (1093), at the base of the Washoe Mountains, near Carson City.

SALIX CORDATA, Muhl., and a var. (?) (= 1096 Watson). Nevada.

SALIX ——— (?) (= 1098 Watson). Furnace Creek, Nevada.

EPHEDRA ANTISYPHILITICA, C. A. Meyer. Nevada and Utah.

PINUS MONOPHYLLA, Torr. Belmont, Nevada.

PINUS EDULIS, Engelm. Arizona.

PINUS PONDEROSA, Dougl. Arizona and Utah.

PINUS BALFOURIANA, Murr. (*P. aristata*, Engelm.) San Francisco Mountains, Arizona, and Utah.

PINUS FLEXILIS, James. Arizona. Also var. MACROCARPA. "Folia subintegra raro hic inde serrulata apice integerrima; strobili squamæ obtusæ rotundatæ paulo (½–1 lin.) projicientes; strobilus (magnus) inde minus quam in specie squarrosus." *Engelm.*, MSS. San Francisco Mountains, Arizona.

ABIES ENGELMANNI, Parry. Same locality.

ABIES GRANDIS, Lindl.? Arizona. Foliage only.

ABIES CONCOLOR, Lindl. Arizona and Utah. Foliage only.

ABIES DOUGLASII, Lindl. Arizona.

JUNIPERUS OCCIDENTALIS, Hook. Arizona and Utah.
JUNIPERUS COMMUNIS, L., var. ALPINA, L. San Francisco Mountains, Arizona, and Utah.
NAIAS MAJOR, Roth. Huntington Valley, Nevada. A new region for this rare species.
EPIPACTIS GIGANTEA, Dougl. Nevada.
SPIRANTHES ROMANZOFFIANA, Cham. Utah.
YUCCA BACCATA, Torr. Arizona. Fruit only.
YUCCA ANGUSTIFOLIA, Pursh. Arizona.
AGAVE UTAHENSIS, Engelm. Arizona.
AGAVE PARRYI, Engelm., ined. Arizona. Fruit only.
VERATRUM ALBUM, L. Utah.
SMILACINA STELLATA, Desf. Utah.
FRITILLARIA PUDICA, Spreng. Nevada.
FRITILLARIA ATROPURPUREA, Nutt. Nevada.
CALOCHORTUS NUTTALLI, Torr. & Gray. Utah.
CAMASSIA ESCULENTA, Lindl. Independence Valley, Nevada.
ALLIUM ANCEPS, Kellogg. Mineral Hill, Nevada.
ALLIUM ATRORUBENS, Watson. Nevada.
JUNCUS BALTICUS, Deth., var. MONTANUS, Engelm. Nevada and Utah.
JUNCUS XIPHIOIDES, Mey., var. MONTANUS, Engelm. Utah.
CYPERUS ROTUNDUS, L., var. HYDRA, Gray. Nevada.
SCIRPUS VALIDUS, Vahl. Nevada.
SCIRPUS MARITIMUS, L. Nevada.
SCIRPUS PUNGENS, Vahl. Nevada.
CLADIUM EFFUSUM, Torr., *Ann. N. Y. Lyc.* 3. 443. Nevada.
CAREX OVALIS, Good. Nevada.
CAREX FESTIVA, Dewey. Utah.
SPOROBOLUS CRYPTANDRUS, Gray, and forms. Nevada, Arizona and Utah. Also var. FLEXUOSUS, Thurb. Nevada and Arizona. A well-marked variety.
SPOROBOLUS AIROIDES, Torr. Nevada.
SPOROBOLUS ASPERIFOLIUS, Thurb. Nevada and Utah.
VILFA RIGENS, Trin. Steud. *Gram.* 158. Arizona.
MUHLENBERGIA DISTICHOPHYLLA, Kunth. Steudel, *Gram.* 178. Arizona.
MUHLENBERGIA TEXANA, Thurb. MS. Arizona.
ERIOCOMA CUSPIDATA, Nutt. Nevada and Arizona.
STIPA SPARTEA, Trin. Utah.
STIPA VIRIDULA, Trin. Utah.
STIPA OCCIDENTALIS, Thurb. Nevada.
ARISTIDA PURPURASCENS, Poir. Arizona.
PLEURAPHIS JAMESII, Torr. Arizona.
SPARTINA GRACILIS, Trin. Nevada.
CHLORIS ALBA, Presl. Steudel, *Gram.* 204. Nevada and Arizona.
BOUTELOUA CURTIPENDULA, Gray. Arizona.
BOUTELOUA POLYSTACHYA, Torr., *Pac. Railroad Rep.* 5. 365, *t.* 10. Arizona.
BOUTELOUA OLIGOSTACHYA, Torr. Utah.
BOUTELOUA FŒNEA, Torr. (*Chondrosium*, Torr., *Emory's Rep.* 153, *t.* 12.) Arizona.
TRICUSPIS PULCHELLA, Torr., *Pac. Railroad Rep.* 4. 156. Arizona.
EATONIA OBTUSATA, Gray. Utah.
MELICA STRICTA, Bol. Nevada.
MELICA BULBOSA, Geyer. Nevada.
GLYCERIA PAUCIFLORA, Presl. Utah.

BRIZOPYRUM SPICATUM, Hook., var. STRICTUM, Gray. Nevada and Utah.
POA TENUIFOLIA, Nutt. Nevada and Utah.
POA ANDINA, Nutt. Nevada.
POA ALPINA, L., var.? (=1312 Watson). Nevada.
ERAGROSTIS PURSHII, Bernh.? (=1321 Watson; 631 Hall, in part, *i. e.*, "*E. reptans*, form," Gray in *Proc. Amer. Acad.* 8. 498). Nevada.
FESTUCA OVINA, L. Utah.
BROMUS CILIATUS, L. Utah.
PHRAGMITES COMMUNIS, L. Utah.
TRITICUM REPENS, L. Nevada and Utah.
HORDEUM JUBATUM, L. Nevada and Utah.
ELYMUS CANADENSIS, L. Utah.
ELYMUS CONDENSATUS, Presl. Nevada and Utah.
AIRA CÆSPITOSA, L. Utah.
PANICUM LEUCOPHÆUM, HBK. (*P. lacnanthum*, Torr., *Pac. Railroad Rep.* 7. 21.) Arizona.
ANDROPOGON MACROURUS, Michx. Southern Nevada and Arizona.
ANDROPOGON ARGENTEUS, DC. Arizona.
IMPERATA ARUNDINACEA, Cyr. Steud. *Gram.* 405. Nevada.
EQUISETUM ARVENSE, L. Utah.
EQUISETUM LÆVIGATUM, A. Br. Nevada and Utah.
ADIANTUM CAPILLUS-VENERIS, L. Nevada and Arizona.
PTERIS AQUILINA, L. Arizona and Utah.
CHEILANTHES FENDLERI, Hook., *Syn. Fil.* 139. Arizona.
PELLÆA WRIGHTIANA, Hook. (*P. mucronata*, Eaton. Hook., *Syn. Fil.* 148.) Arizona.
WOODSIA SCOPULINA, Eaton. Nevada.
FUMARIA HYGROMETRICA, L. Nevada.
USNEA BARBATA, Ach.(?) Arizona.

WASHINGTON, D. C., *May* 10, 1874.

SIR: I have the honor to transmit herewith my report on the botanical results of the field-season of 1873 in Central Colorado. The party of your command under which this collection was made was in charge of Lieut. Wm. L. Marshall, Corps of Engineers. The plants collected in Arizona and New Mexico will be enumerated and commented upon at the close of the present season.

It could hardly be expected that the Colorado collection should contain many new species, as the ground had been already so thoroughly botanized over by Parry, Hall, Harbour, Vasey, Porter, Canby, and others. The collection, however, is large and valuable, and not entirely devoid of novelties.

The names of several of our most eminent botanists appear over the orders, the representatives of which they have been kind enough to name; but besides this, I have received valued assistance from the same gentlemen, of such a character that I could not well specifically allude to it at each instance, and I would here state that especial thanks are due to Prof. Asa Gray, Mr. Sereno Watson, Prof. D. C. Eaton, Mr. Thomas P. James, Dr. George Vasey, Dr. George Thurber, and Mr. Josiah Hoopes, for their generous aid.

I have elsewhere alluded to the activity of Professor Wolf in the labor of collecting.

It is also a pleasant duty to say that, but for the interest manifested by Lieut. Wm. L. Marshall in the work, so fine a collection could not have been made.

I have the honor to be, respectfully, your obedient servant,

J. T. ROTHROCK,
Acting Assistant Surgeon, U. S. A.

GEO. M. WHEELER,
First Lieutenant Corps of Engineers.

PRELIMINARY REPORT ON THE BOTANY OF CENTRAL COLORADO.

Leaving Denver June 12, 1874, a few of the plants of the plains bordering the foot-hills had already passed the proper period for collecting. On all sides of us, however, were enough just ready to burst into bloom to suggest abundant work for the indefatigable botanist of the party, Prof. John Wolf. Just here I would remark that it is thought there were but few plants in proper condition to collect that escaped his observation, and the good state of preservation in which the botanical stores reached Washington is due entirely to the unusual care he bestowed upon them.

I will briefly indicate the botanist's route here, to save a continual reference to it in the body of the report. From Denver the first important point reached was Georgetown, via Apex, Clear Creek, and Idaho Springs. The change from the flora of the plains to that of the mountains may be considered as clearly defined at Apex. After leaving this place, we began the ascent of the foot-hills, which in their estimated average altitude of 8,000 feet afforded enough of variation in physical conditions to outline, as it were, the botanical prospects for the season.

After a halt of a few days at Georgetown, the party started, June 17, for South Park, via the Argentine Pass, (altitude 13,000 feet,) Snake River, Breckenridge Pass, and Tarryall Creek, involving a crossing and recrossing of the divide between the waters of the Platte and the Blue, a tributary of the Colorado of the West, thus giving the opportunity for making almost synchronous observations upon the flora over a range in height of 4,500 feet; this, if we may transfer Humboldt's results from Central Europe to the heart of our continent, being the equivalent of nearly 17° of latitude, going north from our starting-poiut. From some collateral evidence I am led to think the estimate is not far from correct.

During the latter part of June and most of July the botanist was busily engaged in South Park, having there the flat portion of the park, with its soil composed of a mixture of sand and gravel and some loam, on which to collect the plants of the open ground. Though isolated from the plains, this portion of the park in some respects represented the flora we should have had east of the foot-hills. The average elevation of the plain-like portion of South Park may be put down as about 9,800 feet above the sea. From this height up to almost 14,000 feet the botanist could range through successive alpine zones of vegetation in a single day.

July 22, we left South Park, and on the 23d crossed Mosquito Pass, thus allowing the observations taken on the Argentine Pass to be repeated a month and a half later in the season.

July 24, we camped at Twin Lakes, the altitude of which is about 9,400 feet. This was a specially fortunate center for botanical investigation, allowing the quiet water on the lake-shore, the mountain-streams pouring into the lake, the barren stretches of open ground along the Arkansas, and the mountains to the west of camp, all to be readily reached. The deep, shaded ravines, filled with moisture from the streams, which rushed with headlong speed from precipice into chasm, were favorite retreats for the mosses and well repaid the investigation

of Professor Wolf. There was a whole group of plants, indeed, which we found nowhere else. Among them were *Primula Parryi*, *Saxifraga æstivalis*, *Moneses uniflora*, *and Adoxa Moschatellina*.

In September this camp was broken up and the party moved to the San Luis Valley, via the valley of the Upper Arkansas and Poncho Pass. Though late in the season, a fair number of plants not hitherto found by us were collected.

We remained several weeks in the valley, adding largely to the collection, and toward the last of September started for Loma, on the headwaters of the Rio Grande. Owing to the lateness of the season, but few plants were obtained here. Among them were some novelties to the collection. I would especially name Loma as a point worthy of further botanical work. At this place plant-collecting was abandoned for the season.

FLORA OF THE OPEN GROUND.

The most obvious division of the botanical regions traversed during the past season would be into the *open grounds*, including under this head the plains from Denver to the foot-hills, the flat portion of South Park, the immediate valley of the Arkansas, and San Luis Valley proper. There would then remain the mountain-region, including here the entire flora from the lower limit of timber to the highest mountain-tops.

There is at first sight a wonderful sameness about the flora of the plains, which has not escaped the notice of casual observers. The hoary, dry, stunted plants, with the great preponderance of yellow and red flowers, when compared with the more living aspect of the mountain-flora, actually compels a contrast in the mind.

To what is this difference due? Meteorological statistics from Colorado are as yet meager in the extreme. Up to 1872 from only three points did we have observations for a period of over one year. Such at least is the showing of Mr. Schott's "Tables and results of the precipitation in rain and snow in the United States," and neither of these points was fairly within the grasp of the mountains, so that any comparison must be somewhat lame. If, however, we sum up, and average the fall of rain and snow at Forts Garland, Massachusetts, and Lyon, it appears that the mean amount is 12.09 inches. This, however, can only be taken as an approximate estimate for the more open country just east of the main divide, being probably greater than the fall farther east, and certainly less than that west.

Compare this with 39.87 inches, which is the mean precipitation for a series of years in West Virginia. This State is selected because it has some points of similarity to Central Colorado, and because its precipitation is far from excessive. The difference is so great as to suggest that this is an essential feature in the difference of the floras in Colorado, where we probably have a difference as great between the meteorological conditions of its plains and its mountains.

Another meteorological element will probably be sufficient to explain the problem in part. Where we have so small a mean precipitation, it is safe to infer that the atmosphere comparatively seldom reaches the point of saturation; *i. e.*, that there is less than the ordinary amount of aqueous vapor in it. Then it follows that however much of the sun's heat be absorbed by the soil during the day, it will be most freely radiated back into space at night. I cannot better illustrate the full import of this fact than by a quotation at second hand from Tyndall: "Aqueous

vapor is a blanket more necessary to the vegetable life of England than clothing is to man. Remove for a single summer-night the aqueous vapor from the air which overspreads this country, and every plant capable of being destroyed by a freezing temperature would perish. The warmth of our fields and gardens would pour itself unrequited into space, and the sun would rise upon an island held fast in the iron grip of frost."

These, then, being the climatic conditions, somewhat, of the plains during the growing period of the year, it does not seem strange that the *ensemble* of the flora should be as peculiar. The diurnal range of temperature during the summer-months is at times immense. In South Park I have seen the temperature as high as 90° Fahr. at 2 p. m., and on rising the next morning find a film of ice coating the little accumulations of water around camp. Our *familiar forms* of plant-life would almost all be destroyed under such an alternation of heat and frost for year after year. The plants, then, that we do find surviving are, as a rule, more dwarfed, more villous, and with denser tissues than those of more genial regions. Nature would appear to have especially guarded them against excessive evaporation of their fluids on the one hand and freezing on the other, and meeting both contingencies by a small supply of water in their tissues, retaining that which they possess under the double guard of villosity and contraction. I am aware that Mr. Watson, in his most valuable report on the Botany of the Fortieth Parallel, is prepared to admit a large evaporation from the more succulent portions of the plant.

The monotonous character of the flora of the driér regions does, in some measure, disappear, when, on examination of these plants, so uniform in general appearance, we find a large number of genera and species differing from one another by the small amounts *compatible with their surroundings*. This (the surroundings) in part accounts for the predomination of some orders and often of genera. We find a somewhat similar condition of things in the center of greatest development of the *Proteaceæ* in Australia or the *Pelargoniums* in South Africa.

Comparatively few of our eastern plants are found in these open grounds, and where one does occur it is apt to be a cosmopolitan weed, whose pliant constitution adapts it to any condition of life as well as to the hostility of man. *Polygonum aviculare* and *Chenopodium hybridum* are examples. Among the exceptions to this statement is *Ranunculus cymbalaria;* but its natural habitat on the western open lands is, by choice, alkaline soils, where, for a portion of the year, at least, it can obtain moisture, just as with us it frequents salt-marshes and the seashore.

Among the mountains, on the contrary, we find a larger number of familiar plants. Indeed, the list is so large that it would be a real labor to begin the enumeration. Those plants embraced under the common name of weeds are from necessity found usually on the roadsides and about habitations, just where they can be transported by human agency, and find, among other essentials, water. It is wonderful with what rapidity they have occupied the ground in many places.

FLORA OF THE MOUNTAINS.

Leaving the level ground, we at once come fairly within the range of the timber. In South Park, this is not far from 10,000 feet; tongue-like projections of trees do extend lower down; but I refer to the main body of the forests.

At Twin Lakes the timber begins at about 9,500 feet. In the San Luis Valley it is much lower, about 6,500 feet above the sea. Here, however, the lowland coniferous growth is made up entirely of *Pinus monophyllus* * and *Juniperus Virginiana.*

It seems that where the hills begin fairly, they have been seized at once by some tree. Cottonwood-trees appear both on the plains and mountains, where the supply of water is constant or nearly so. The conifers above named are constantly found associated on the foot-hills at least as far north as Cañon City. They do not fairly enter South Park. The line along the valley of the Arkansas is sharply drawn. The ridge dividing it from Trout Creek is covered on its western slope by these trees, while to the east of it they hardly appear.

From some facts observed, I am led to think that at no distant past the growth of *Coniferæ* extended much lower into the park than it now does. I have seen the decaying remains almost down to the Platte. The knots, which, as is well known, last a long time, were found scattered here and there frequently in the lower portions of the open ground. An occasional isolated clump of these trees still survives, far removed from their associates on the mountain-sides; and at times one may observe that the prolongations of pine-woods, which extend out into the Park, become less and less dense, until finally only a single tree remains at intevals, these disappearing, and then only the half-decayed remains reach farther out toward the valley. In one place it was observed that the tops of these dead trees all pointed to the east. This suggested the idea that the destruction may have been due to one of the fierce west winds, which, during the fall-months, are so prevalent in South Park. Once destroyed, other vegetation might readily crowd the young trees out. A notable example of this was seen in one portion of the foot-hills, where a whole forest of *Pinus monophyllus* lay prostrate, with not a single young tree coming on. As bearing upon this question of recession of the *Coniferæ* toward higher ground, I may also remark that where these tongues of timber ran down toward the center of the Park, the oldest trees are *Coniferæ* and the younger growth is of cottonwood. This is especially marked at the lowest limit of the trees. Perhaps mere "rotation of crop" may serve to explain the change.

The timber-belt ends at about the greatest center of development of the nutritious bunch-grasses, though these do extend in magnificent growth up into the open valleys and among the less dense timber to an altitude of nearly 11,000 feet.

From South Park to the New Mexican line we regularly found abundance of this forage on the eastern slope of the main chains. In the beautiful valley of the Conejos River, after striking the timbered region, we found luxuriant bunch-grass covering the ground as thickly as it could stand. In November it was still green about the roots, and was eagerly eaten by our starved mules. *Pinus ponderosa* formed open clumps, and under protection of these trees it attained what seemed to be its maximum growth.

From 9,500 to 10,500 feet the principal arboreous growth was made up of *Pinus contorta*, *Pinus ponderosa*, *Abies Menziesii*, *Abies alba*, and *Abies balsamea*. *Abies Douglasii* seemed more at home at a somewhat less elevation. *Pinus ponderosa* was frequently seen to extend in full size almost to the verge of the timber-line, and often to attain its largest growth at an elevation of 11,000 feet.

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* I here accept the determination of Mr. Josiah Hoopes, who has given this order especial attention, though other botanists call the tree in question *Pinus edulis*, Engelm.

In this belt (from 9,500 to 10,500 feet) *Berberis aquifolium* formed a conspicuous feature of the flora, especially in the more open woods. The herbaceous vegetation of the same zone is well represented by *Castilleja pallida*, *Parnassia parviflora*, *Pedicularis Grœnlandica*, *Habenaria dilatata*, *Polygonum bistorta*, *Trifolium dasyphyllum*, *Senecio triangularis*, *Gentiana detonsa* and *acuta*, with several species of *Pentstemon*.

From 10,500 feet to timber-line, (approximate estimate, 11,500 feet,) a change more or less marked occurs in the vegetation. This zone embraces within its limits a greater diversity of soil, exposure, and local differences of temperature than the one we have just described. There are open valleys with perfect drainage, and hence dry soil; and others so swampy that it is almost impossible to ride over them; rocky slopes and deeply-shaded ravines, which are always damp from the spray of a mountain-stream. Hence it is not surprising that a more diversified flora should be found here. *Pinus flexilis*, continuing over from the lower zone, now, in this its favorite altitude, becomes the predominant conifer. It is subject to great changes in its habit, and among these there is none more remarkable than the greater crowding of its leaves as you reach the still luxuriant though more alpine forms. The herbaceous vegetation is represented by *Primula Parryi*, *Adoxa Moschatellina*, *Trollius laxus*, var. *albiflorus*, *Caltha leptosepala*, and *Trifolium Parryi*; the first four finding in the cold streams and snow-fed bogs most congenial homes.

At timber-line a most complete change comes over the landscape and with it over the flora. *Pinus Balfouriana*, after becoming more and more common as we ascended the last thousand feet, has now attained the supreme place in the tree-flora. Except it, all other trees have disappeared under the increasing rigor of the alpine surroundings. It, too, has been dwarfed to the last degree compatible with the dignity of a tree. Where timber-line coincides nearly enough with the summit of the mountain to allow the strong west winds of the region to exert their full force upon the tree, it lies prostrate, with the top always pointing eastward, and having just enough of leaves, often, on its stunted branches to give sign of life. When some high cliff affords a shelter, the tree rises perpendicularly until the top is above the protection afforded, and it is then forced to take the eastward inclination.

From timber-line up, the surface may be bare of all vegetation, and simply a mass of rocks, (usually volcanic,) or it may be more or less densely covered with a mixed sward of grass and sedges. Here and there, blooming in profusion, will be found clumps of *Dryas octopetala*, *Trifolium nanum*, *Saxifraga Hirculus* and *flagellaris* and *serpyllifolia*, *Actinella grandiflora*, and *Gentiana Parryi*. The last-named was found in full bloom near the summit of Red Mountain in August. Dwarfed specimens of *Solidago virga-aurea* and *Salix reticulata* mingle themselves with the grass of the sward, and almost escape detection until looked for closely. Even these disappear as we approach an altitude of 14,000 feet, and there remains then hardly anything except *Claytonia arctica*, which sends its long thick root deeply down among the rocks after its nourishment.

TIMBER.

Pinus contorta, Dougl.—("Twisted-branched Pine;" "Red Pine.")—This tree grows 40 feet high and has a diameter of about a foot; wood is coarse-grained. Where nothing better offers, it may be sawed into boards.

Pinus flexilis, James.—("American Cembran Pine.")—Attains in Cen-

tral Colorado a height of 50 feet in its best situations, with a diameter of a foot and a half. The shape and color of the cones as well as the pliable character and white wood of the young shoots are, as Dr. Parry has already noted, strikingly suggestive of the White Pine of the East. The extremely slow growth of this tree is remarkable. The trunk, as a rule, is quite too full of knots to make good boards, though there is no reason why the less-stunted specimens might not be used for coarse, heavy timbers.

Pinus Balfouriana, Murr.—This tree is seldom if ever found at an altitude less than 9,000 feet above the sea. It is the last to survive the exposure on the mountain-tops; and finding a pine at timber-line is presumptive evidence that it is this species. It grows sometimes 35 feet high and 18 inches in diameter; has little value as a timber.

Pinus monophyllus, Torr.—(Piñon-Pine of Southern Colorado.)—Further south this name is given to another kind of pine. Both trees, however, furnish edible nuts. The *Pinus monophyllus* is the one so frequently alluded to by Frémont as the Nut-Pine. It furnishes capital fuel, having enough of the terebinthinate in it to make an intensely hot fire. This is the most important use to which the tree is applied. It ranges from the hills near Cañon City south, not going into the mountains west until it has crossed the valley of the Arkansas.

Pinus ponderosa, Dougl.—("Yellow Pine" of the West.)—This is the largest and most valuable of the trees in the region surveyed during the past season. It makes the best lumber the country affords, and, besides, is quite abundant, though this fact will probably be the reason why it will be the first to be extirpated before the growing needs of an increasing population. In the valley of the Conejos River it was found growing 60 to 70 feet high, with a diameter of nearly a yard.

Abies Douglasii, Lindl.—Tree 60 to 90 feet high, though becoming much smaller as it ascends the mountain-sides. As a timber it is only middling in quality. It does well for beams, &c. It becomes much larger and more valuable on our northwest coast and has fewer knots than on the Rocky Mountain ranges. It is known according to Mr. Watson in the Uintah Mountains as "Bear River or Swamp Pine."

Abies Menziesii, Lindl.—This tree attains an average height of from 50 to 60 feet. Timber hard and coarse-grained, but is serviceable for rough work.

Juniperus Virginiana, L.—A much branched dwarfed tree, found associated with the Piñon-Pine. It is of great value as furnishing the most durable fencing-posts. It is probably abundant enough in Southern Colorado to meet the demands for many years.

There are, besides, several species of cottonwood, none of them, however, being of any great value except for shade.

It may be well to remark that, on almost any if not all of the ranches where irrigation is possible, in a few years the settler may relieve the constant glare of the sun by a fine thrifty cottonwood-grove about his buildings. The experiment has so often succeeded that it is no longer a problem to solve.

AGRICULTURAL RESOURCES.

Taking Denver as a starting-point, it is known that fair crops of wheat, rye, oats, barley, and corn may be raised with a tolerable degree of certainty, where irrigation can be resorted to. The same statement is true of the region east of but bordering the foot-hills as far south as the survey extended this year; the certainty (other things being equal)

increasing toward the south. Grasses and sedges suitable for grazing purposes flourish in greater or less abundance, especially as the foothills are approached and the valleys between them penetratéd into.

The drier portions of the country (especially where water is within reach) may be advantageously utilized as sheep-walks. The grass of such regions is nutritious and abundant enough for this purpose. As an illustration I may allude to Huerfano Park, which now affords pasturage to immense droves of sheep. The great objection to allowing them indiscriminate range is, that where they go, the grass is so soiled that horses and cattle refuse to touch it. Hence the bitter antagonism between the two classes of herdsmen. An equitable division of the *public lands* would be to confine the sheep to the region of the shorter grasses, and giving cattle and horses the range of the taller bunch-grass. Of course, when the land was definitely settled, surveyed, and paid for, the proprietor would consult his own individual interest.

Along our route the possibilities of agriculture died out as we approached Georgetown, though here and there an acre under cultivation showed that the farmer must have received some return for his labor. The valleys still furnished a fair quantity and quality of bunch-grass.

We leave the country between Georgetown and South Park out of the question for agricultural purposes. There were, as usual, some beautiful summer-ranges for herds. One especially, along a tributary of the Snake River, was covered with a luxuriant crop of grass. The soil, too, was fertile and, but for its altitude, would have produced large crops of the ordinary cereals.

South Park, 9,842 feet above tide-water, so far as known, does not promise much in the way of grain-raising. It has frequent frosts during the summer-months, and the temperature at the same time is so low as to almost inevitably destroy all the cereals. On the morning of July 3, the ground was covered to a depth of two inches with snow as low down as the level of Fair Play. Its utmost will probably be accomplished in the way of agriculture in the production of turnips, cabbages, and possibly potatoes, with other vegetables equally hardy. It will, however, be an important grazing ground. Large herds of cattle now roam at large over it. In 1872 and in 1873 the experiment was tried of wintering the stock in the park. It is asserted that it was successful, and that the herds kept there were in better condition in spring than those that had been driven for the winter to the valley of the Arkansas.

The bunch-grasses in the smaller parks toward the mountains are of wonderful luxuriance, and will furnish abundant food for many thousand head of cattle. Sheep do well on the more level portions of the park, among the shorter grasses.

The valley of the Upper Arkansas, as we first saw it, twelve miles above Twin Lakes, certainly looked like anything but a land of promise. Along its central axis, the soil appeared absolutely unproductive, and seemed fit to raise nothing but "prickly pears and sage-brush." Yet we have abundant evidence that, if the climate were not too rigorous, under irrigation this same soil would raise fair crops. The smaller valleys leading down from the mountains on either side and intersecting the main valley at right angles all produced abundance of bunch-grass, though not so luxuriantly as South Park. In crossing into this valley from South Park, we had made a descent of some 400 feet, and found as a rule a climate proportionately more genial. At Twin Lakes, potatoes grew large enough to be eaten before the early frosts destroyed the tops. It is not improbable that some of the hardier grains might be raised at this point. By September, the yellow leaves on the cottonwood-trees

along the mountain-slopes indicated plainly enough that we had reached the limit of the "growing-season" there.

Reports reached us of fertile valleys with abundant pasturage west of Twin Lakes.

The first fairly good farm we saw after leaving Denver was that of Mr. Lenhardi, on the Arkansas, twelve miles below Granite, August 27. We found that Mr. Lenhardi had just finished his harvest. He had a good crop of oats, barley, and potatoes. He admitted, however, that his success was earned by continuous irrigation through several months. Below him were several other ranches equally good. So narrow was the belt of fertile land that the ranches were often over a mile long, and hence, to include the legal one hundred and sixty acres, could not have been wide at any point.

Following down this valley, we saw the first flouring-mill at Chalk Creek. It was probably the best indication that we were not far from the northern limit of successful cultivation of the ordinary cereals.

Leaving the Arkansas Valley at McPherson's ranch, we crossed the Saguache Mountains via the Poncho Pass, which is reported as 8,600 feet high. It is probably somewhat over this estimate, though still far below timber-line. South of us lay San Luis Valley, concerning the agricultural value of which there are so many contradictory reports. Settlers in the valley are loud in its praise; others are, as a rule, loudest in their disparagement of it. It may be premised that snow seldom falls to any depth or lies long on the ground. These conflicting reports probably find their solution in the fact that the most important roads over which by far the largest share of the travel passes are located in the most barren portion of the valley; hence those simply passing through it receive a most unfavorable impression as to its resources.

To make this statement more clear, we will make the following divisions of the valley:

First, that portion bordering the water-courses, where the soil is confessedly fertile and irrigation is possible. The land lying along the banks of the Saguache is the best illustration of this. The soil there is the product (on the surface) of the immense crops of rank sedges and grasses that have for centuries grown, died, and decayed there. To say that it is as fertile as land can be, is not in the least overstating the truth. "Breaking it up" is simply preparing a vast compost pile for "seeding."

The following facts were obtained from Mr. Frank Brown, one of the most reliable men in the valley: Oats per acre produces 40 to 50 bushels, weighing 40 pounds per bushel; barley per acre produces 50 bushels, weighing 55 pounds per bushel; "bald barley" per acre produces 50 bushels, weighing 75 pounds per bushel; wheat per acre produces 30 bushels, weighing 65 to 68 pounds per bushel; potatoes per acre produce 300 bushels, of course an unusual yield; turnips, onions, beets, radishes, and cabbages yield well and grow to an immense size. I can personally vouch for the truthfulness of most of these facts. (I find, on looking over a letter received from Mr. L. A. Phillips, of the "Colorado Farmer," that the estimate of the crops for Colorado is, on the average, per acre, wheat, 28 bushels; oats, 40 bushels; potatoes, 150 bushels; corn, 25 bushels; and barley, 35 bushels. This estimate is by no means a fair showing for the corn of certain portions of the Territory. Fall-grains have not yet been extensively enough tried to test the relative merits of fall and spring crops.)

Along the Carnero, Logarita, and Rio Grande, the soil is not so productive of large crops as the Saguache region; but, to offset this, it is

found that the crops are perhaps less likely to be injured by early frosts, and a larger variety of productions may be depended upon. In fact, all our ordinary garden-vegetables grow on the banks of these streams.

Despite all that has been said of the general innutritious qualities of sedges as a forage, the stock in the San Luis Valley thrives the year around on them. There, over thousands of acres, these plants grow more than four feet high.

Irrigation is possible anywhere in this first division, and water (slightly brackish) is usually obtained by digging a few feet.

The second division is made up of the higher ground, beyond reach of irrigation. The soil and its productions undergo a complete change. Gramma-grass, chico, and greasewood are here the prevailing growth. The soil is unpromising in appearance, yet would, if irrigation were possible, produce fair crops. It will not be likely to be brought under the domain of agriculture for many years. Most propitious seasons are, in the absence of water, absolutely required for this kind of soil. It is, however, the legitimate sheep-walk of the valley.

The third division are the sand-wastes, where there is no water and almost no vegetation. Even the chico and sage-brush are barely able to live there. I know of no use to which it can be put. There are some sheep occasionally found on it, but they derive most of their subsistence from the adjacent *vega*, or lowland.

It is known, also, that in the smaller valleys between spurs of the mountains, bunch-grass is found in considerable quantity. The piñon-groves furnish shelter and a certain amount of gramma-grass during the winter for the herds that frequent them.

From Loma, south, wheat has long been a regular crop. Corn, too, produces small ears with certainty at Conejos. It is not unlikely that they could be increased in size by the introduction and thorough acclimation of better seed.

I have received the following letter from a reliable and accomplished resident of Colorado, which is important, and probably as much in place here as in any other portion of the report.

Yours of the 9th of March is received, and I would hereby ask leave to correct a statement made in the report which I sent you, viz, the estimate of the area available for agricultural purposes in Colorado. That estimate was made upon the generally prevailing idea that only the valleys adjacent to the streams of water could be cultivated. A much more scientific and careful estimate has since been made by a calculation of the amount of water annually discharged through our mountain-streams and the amount required per acre for thorough irrigation, showing that about 7,000,000 acres may be cultivated by properly using all the water from the streams. Should artesian wells be successfully opened, the agricultural land would be increased, as it is not *land*, but *water*, which puts the limit upon our available agricultural resources.

Respectfully,

L. A. PHILLIPS.

Enumeration of plants collected in Central Colorado by Prof. John Wolf, during the field-season of 1873, *and under the auspices of the Wheeler exploring expedition, party No. 2; Lieut. William L. Marshall in command.*

RANUNCULACEÆ.

CLEMATIS DOUGLASII, Hook. Banks of Clear Creek. June. (92.)
C. LIGUSTICIFOLIA, Nutt. Valley of the Upper Arkansas. September. (89.)
C. LIGUSTICIFOLIA, Nutt., var. with smaller, more toothed leaves, which

evince a disposition to be trifoliate rather than pinnate, with five leaflets; fruit typical; male flowers not seen. (90.)

C. ALPINA, Mill., var. OCHOTENSIS. Subalpine ridges among timber. June. (91.)

ANEMONE MULTIFIDA, DC. South Park; altitude, 9–11,000 feet. (105 and 108.)

A. PATENS, L., Rgl. Clear Creek and South Park; altitude, 6–10,500 feet. (107.)

A. NARCISSIFLORA, L. Summit of Grant's Peak. (102*a*.)

RANANCULIS AQUATILIS, L., var. STAGNATILIS, DC. Denver. June. Flowers almost as large as in *R. Purshii*. (112 and 114.) Var. *trichophyllus*, Chaix. Twin Lakes; altitude, 9,500 feet. (113 and 115.)

R. FLAMMULA, L., var. REPTANS. Common. Var. *filiformis* (*R. reptans*, L., var. *β filiformis*, DC., and in T. & G., Fl. N. Am.) (172 and 173.)

R. CYMBALARIA, Pursh. Everywhere in low moist ground, evincing a choice for alkaline soils, but flourishing in the freshest of snow-water; altitude, 5–10,000 feet. From Saguache, in San Luis Valley, we have a form with erect, stout scape, bearing three or four flowers, having thicker and larger leaves, and manifesting little or no tendency to produce stolons. (101.)

R. AFFINIS, R. Br., var. CARDIOPHYLLUS, Gray. (*R. Cardiophyllus*, Hook.) Altitude, 8–9,000 feet. June and July. (121 and 170.) *R. affinis*, R. Br., var. *β*, Hook. Exactly the plant of Plate vj, Fl. Bor. Am. (120.) In my specimens the hairy carpels of var. *β* afford by far the most marked distinction from var. *cardiophyllus*. The akenes in *β* are also larger than in the other variety.

R. GLABERRIMUS, Hook. Leaves rather lanceolate than ovate. Plate v, Hooker, Fl. Bor. Am. (122.)

R. SCELERATUS, L. Cauline leaves with manifest tendency to division of the lobes; otherwise like our eastern form. (99, 110, 111, 116.)

R. PURSHII, Richardson. Among my specimens are a large number with petals trifid and the scale distinctly 3-lobed. Twin Lakes; altitude, 9,500 feet. July and August. (117.)

R. HYPERBOREUS, Rottbæll, var. NATANS, (C. A. Mey.) Twin Lakes; altitude, 9,500 feet. (100.)

R. RECURVATUS, Poir. Style not conspicuously recurved, but in degree of hairiness, compressed achenia, relative size of sepals and petals, shape and dentition of scale markedly corresponding with description as given by T. & G. (162.)

R. ADONEUS, Gray. Apex. In original description of this plant, Gray refers to it as being strictly alpine. Our specimens from the same region were collected at an altitude but little greater than that of Denver, which is 5,317 feet above the sea. (118.)

MYOSURUS MINIMUS, L. Blue River. June. Dwarfed. Altitude, 8,000 feet and upward. (169.)

CALTHA LEPTOSEPALA, DC. Common in the mountainous portions of Colorado; altitude, 8–12,000 feet. (109.)

TROLLIUS LAXUS, Salisb., var. ALBIFLORUS, Gray. South Park; altitude, 10–12,000 feet. Cold bogs. July. One of the most conspicuous early flowering alpine plants, and where found usually blooming in great profusion. (102.)

AQUILEGIA CŒRULEA, Torr. Open woods; common; altitude, 10,000 feet. July. (163.)

DELPHINIUM ELATUM, L., var. No. 84 of Parry's collection. In general habit my specimens bear a striking resemblance to *D. scopulorum*, Gray, being quite too slender, with leaves and their divisions too nar-

row to accord with the specimen I have from collection of Hall and Harbour, but the lower petals are so decidedly those of *D. elatum* that I am constrained so to name it. (96.)

D. MENZIESII, DC. Snake River. June. (97.)

ACONITUM NASUTUM, Fisch. Comparing plants of the present collection with those of the same species in collection of Hall and Harbour, I find them shorter, more leafy, with larger flowers, and much narrower lobes to the leaves. (98.)

ACTÆA SPICATA, L., var. ARGUTA, Torr. Flowers absent. Pedicels vary from less than a quarter to more than half an inch in length in the fully-formed fruit. There is no perceptible thickening of the pedicel with age, and this I take to be the most reliable characteristic furnished by the fruiting specimens.

THALICTRUM ALPINUM, L. South Park; altitude, 10,000 feet. Typical specimens large. (94.)

T. FENDLERI, Engl. South Park; altitude, 10,000 feet. Only female specimens obtained. (93.)

BERBERIDACEÆ.

BERBERIS AQUIFOLIUM, Pursh. West of the main range, on Snake River. June. (57.)

FUMARIACEÆ.

CORYDALIS AUREA, Willd., var. CURVISILIQUA, Eng. Everywhere common in the mountains, and flowering from May through July.

CRUCIFERÆ.

NASTURTIUM SINUATUM, Nutt. (618.) San Luis Valley, on the alkaline flats; leaves absolutely coriaceous though beautifully and regularly pinatifid. 625 is from Apex; like the other, though with much thinner leaves.

N. OBTUSUM, Nutt. Twin Lakes. (617.)

N. PALUSTRE, DC. Twin Lakes. (627.)

N. PALUSTRE, DC., var. HISPIDUM, Gray. San Luis Valley. September. (626.)

ARABIS HIRSUTA, Scop. South Park. Twin Lakes. (650, 652.)

A. DRUMMONDII, Gray. South Park. July. (655.)

A. RETROFRACTA, Grah. Common and variable.

CARDAMINE CORDIFOLIA, Gray. Clear Creek and South Park. (608, 609, 610.)

VESICARIA LUDOVICIANA, DC. Clear Creek Cañon. June. In flower. (647.) Subalpine.

V. MONTANA, Gray. From dry plains of South Park. With straighter pedicels, smoother and more oblique fruit than the specimens furnished by Hall and Harbour. (641.)

PHYSARIA DIDYMOCARPA, Gray. Clear Creek and South Park. Alpine and subalpine. (642, 648.)

DRABA ALPINA, L. South Park; at from 12,000 to 13,500 feet elevation. (646.) July.

D. AUREA, Vahl. Alpine woods. July. (633, 634.)

D. STREPTOCARPA, Gray. Alpine, along with *aurea*. My specimens furnish a singular example of transposition of characters usually reliable, in distinguishing between these species; *i. e.*, *aurea* and *strepto-*

carpa. My specimens, which have the fruit most characteristic of *streptocarpa*, are in other respects most like (generally including the length of style also) *aurea*. I must, however, say that the fruit is in no instance so much twisted as in the original specimens on which *streptocarpa* was founded. That differences sufficient to constitute distinct species exist between the extreme forms no one will probably deny. It is equally certain that they both shade into one another until at times all tests are doubtful and justify a place under either name. These species furnish a "*reductio ad absurdum*" to the idea that extreme forms so connected must be considered as one species. In this instance I have named as *streptocarpa* all specimens having leaves "beset and especially ciliate, with long and rigid, shaggy, spreading, simple or simply forked hairs, far more bristly than in *D. aurea*, and with no fine stellular pubescence intermixed." I rely more on this character in deciding between *interloping* specimens than on any other.

D. NEMOROSA, L. Stems leafy; pedicels about as long as the silicles, which are pubescent on their edges, becoming, however, glabrous with age. My specimens have the flowers bright yellow on opening, and a clear white when a day older, before even they begin to wither. (637.)

D. NEMOROSA, L., var. LUTEA, Gray. Georgetown. June. (628.)

D. NEMOROSA, L., var. CRASSIFOLIA, S. Wats. Open woods. 10–11,000 feet. (636.) (635 is a still more reduced form from still greater altitudes.) Some extreme forms to me look quite near *D. Caroliniana*, Walt., var. *micrantha*, Gray, to which I apprehend they will yet be removed.

D. INCANA, L., var. CONFUSA, Hook. Plant agrees with authentic herbarium specimens bearing the above label. (Number mislaid.)

SISYMBRIUM CANESCENS, Nutt. One form of which exactly resembles, so far as I can determine in the absence of fruit, the var. *I* of T. & G. (598, 611, 612, 614.)

SMELOWSKIA CALYCINA, Meyer. Alpine in Central Colorado. (601.)

ERYSIMUM CHEIRANTHOIDES, L. Twin Lakes; altitude, 9,400 feet. July. (651.)

E. ASPERUM, DC., var. ARKANSANUM, Nutt. Kit Carson, Clear Creek, South Park. (593, 596, 599, 640.)

E. ASPERUM, DC., var. PUMILUM, Watson. Blue River. (594.)

E. VIRGATUM, Gray. (*Sisymbrium virgatum*, Nutt.) South Park, Clear Creek. (605, 606.)

THELYPODIUM INTEGRIFOLIUM, Endl. Dwarfed specimens. South Park. August. (645.)

CAMELINA SATIVA, Crantz. Apex. Introduced. (604.)

LEPIDIUM INTERMEDIUM, Gray. Specimens too young. (597.)

L. ALYSSOIDES, Gray. South Park, San Luis Valley. (623.)

L. MONTANUM, Nutt. San Luis Valley. Fruit and flowers in September. (624.)

THLASPI ALPESTRE, L. Clear Creek, and common in alpine and subalpine regions of Central Colorado. I have no means of comparing it with the European specimens, but accept Mr. Watson's conclusion in regard to it. Certainly it is very variable. (607.)

CAPPARIDACEÆ.

CLEOME INTEGRIFOLIA, T. & G. Dry plains. August to September. (760.)

C. SONORÆ, Gray. San Luis Valley. (761.)

VIOLACEÆ.

VIOLA CANADENSIS, L. Apex. June. (77, 78.)
V. CANINA, L. (56 of Hall and Harbour.) Snake River, west of the main range. June. (75.)
V. NUTTALLII, Pursh. Denver. June. (76.)

CARYOPHYLLACEÆ.

SILENE ACAULIS, L. South Park. 12,000 feet. July. (362.)
S. MENZIESII, Hook. Twin Lakes. July. (355.)
LYCHNIS APETALA, L South Park. July. (No number.)
L. DRUMMONDII, Watson. South Park, Twin Lakes. July and August. (363.)
CERASTIUM VULGATUM, L. (352.)
C. ARVENSE, L. South Park, Blue River. July. (348, 350, 351, 353.)
STELLARIA JAMESIANA, Torr. Apex. June. (339.)
S. LONGIPES, Goldie. Clear Creek, above Georgetown (east branch). South Park. (340.)
S. LONGIFOLIA, Muhl. Twin Lakes. July. (338.)
ARENARIA FENDLERI, Gray. South Park, in dry places. July. (349.) Also var. *sub-congesta*, Watson. Twin Lakes.
A. VERNA, L., var. HIRTA, Fenzl. Mosquito Pass. July. (345, 346.)
A. ARCTICA, Stev., var. OBTUSA, T. & G. South Park, at 11,000 to 13,000 feet altitude. June. (364.)
A. ALPINA, L. South Park. Alpine. (343.)
A. ROSSII, R. Br. South Park. July. Alpine. (344.)
A. LATERIFLORA, L. Twin Lakes. July. (347.)
SAGINA LINNÆI, Presl. South Park. July. (341, 342.)

PORTULACACEÆ.

PORTULACA OLERACEA, L. (?) Too old to determine with certainty. San Luis Valley. (989.)
TALINUM PYGMÆUM, Gray. Snake River. June. (73.)
CLAYTONIA ARCTICA, Adams, var. MEGARHIZA, Gray. 13,000 to 13,800 feet. Gray's Peak and mountains of South Park. (74.)

ELATINACEÆ.

ELATINE AMERICANA, Arn. Twin Lakes, San Luis Valley, Rio Grande at Loma. (775, 776.)

HYPERICACEÆ.

HYPERICUM SCOULERI, Hook. Twin Lakes, San Luis Valley. (61, 62.)

MALVACEÆ.

SIDALACEA MALVÆFLORA, Gray. Valley of the Upper Arkansas. (14.)
MALVASTRUM COCCINEUM, Gray. Plains, South Park, and San Luis Valley in dry situations. (12.)
SPHÆRALCEA INCANA, Torr. (13.)

LINACEÆ.

LINUM PERENNE, L. Apex, South Park. (66, 67.)

GERANIACEÆ.

GERANIUM RICHARDSONII, F. & M. South Park. July. (758.)
G. FREMONTII, Torr. South Park. July. (759.)

SAPINDACEÆ.

ACER GLABRUM, Torr. Common along mountain-streams. (1.)

LEGUMINOSÆ.

[For the determination of this order I am indebted to Prof. Asa Gray and Mr. Sereno Watson. It is but justice to them to state that the work was done under great pressure for time. It is known, however, that the determination may be relied upon as being as accurate as is possible under the circumstances. The names alone of these gentlemen are a sufficient warrant for this assertion.—J. T. R.]

VICIA AMERICANA, Muhl. Denver. June. (186.)
LATHYRUS PALUSTRIS, L. (?) Clear Creek. June. (187.)
L. LINEARIS, Nutt. Denver. June. (185.)
GLYCYRRHIZA LEPIDOTA, Nutt. Valley of the Upper Arkansas. (190.)
PSORALEA FLORIBUNDA, Nutt. (858.)
P. LANCEOLATA, Pursh. Denver. June. (181.)
TRIFOLIUM NANUM, Torr. South Park; altitude, 13,000 feet. (175, 874.)
T. DASYPHYLLUM, T. & G. Gray's Peak. July. South Park. (182, 183.)
T. PARRYI, Gray. Twin Lakes, South Park; alpine. July. (177, 184.)
T. INVOLUCRATUM, Willd. Valley of the Upper Arkansas River. (176.)
HOSACKIA PUBERULA, Benth. (191.)
ASTRAGALUS CARYOCARPUS, Ker. Denver. June. (232.)
A. ADSURGENS, Pall. South Park. July. (336.)
A. HYPOGLOTTIS, L. (231, 242, 867.) South Park and Apex.
A. DRUMMONDII, Dougl. Apex. June. (215.)
A. RACEMOSUS, (Pursh.) Apex. June. (216.)
A. GRACILIS, Nutt. Kit Carson. Plains. June. (248.)
A. ABORIGINUM, Richards. Dwarf. South Park. July. (249.)
A. OROBOIDES, Hornem., var. AMERICANUS, Gray. South Park. July. (233.)
A. ALPINUS, L. South Park. July. (245, 246, 211?)
A. LOTIFLORUS, Hook. Denver. June. (239.)
A. MISSOURIENSIS, Nutt. Kit Carson, Plains. (240.)
A. SHORTIANUS, Nutt. Clear Creek. June. Alpine. (241.)
A. PARRYI, Gray. (237.)
A. PECTINATUS, Dougl. Kit Carson, Plains. (234.)
A. FENDLERI, Gray. Apex. June. (226.)
A. HALLII, Gray. South Park. July. (228, 247.)
A. MULTIFLORUS, Gray. South Park. July. (207, 250.)
A. TEGETARIUS, S. Watson. South Park. July. (243.)
A. CAMPESTRIS, Gray. Blue River. June. (218, 320.)
A. JUNCEUS, Gray (?). Denver. June. (235.)
A. ———. South Park. July. Alpine. (227, 251?)
A. ———. South Park. July. (229, 244?)
OXYTROPIS MULTICEPS, Nutt. Gold Hill. (213.)
O. LAMBERTI, Pursh. Oro City, Kit Carson. (220–224.)
O. SPLENDENS, Dougl. South Park. July. (225.)
O. DEFLEXA, DC. South Park. July. (217.)

O. VISCIDA, Nutt. South Park. July. (252.)
LUPINUS ARGENTEUS, Pursh. Mosquito Pass. (196.)
L. ARGENTEUS, Pursh., var. DECUMBENS, S. Watson. Near Gray's Peak. (197, 202.)
L. SILERI, S. Watson, *sp. ined.* Rio Grande at Loma. (195.)
L. CÆSPITOSUS, Nutt. Blue River. June. (200.)
L. PUSILLUS, Pursh. Denver. June. (198.)
THERMOPSIS FABACEA, DC., var. MONTANA, Gray. Denver. June. (201.)
SOPHORA SERICEA, Nutt. Kit Carson and Apex. June. (238.)
DESMANTHUS VELUTINUS (?). (192.)

ROSACEÆ.

PRUNUS DEMISSA, Walp. Twin Lakes. August. (200.)
SPIRÆA DUMOSA, Nutt. Valley of the Upper Arkansas River. September. (401.)
RUBUS STRIGOSUS, Michx. Mosquito Pass. July. (388.)
R. DELICIOSUS, Torr. Apex. June. (389.)
CERCOCARPUS PARVIFOLIUS, Nutt. Common on dry ridges, at about 10,000 feet altitude. Flowers in June and July. Fruit matures in August. (69, 980.)
DRYAS OCTOPETALA, L. South Park; altitude, 12,000 feet. July. (399.)
GEUM MACROPHYLLUM, Willd. Twin Lakes. July. (380.)
G. TRIFLORUM, Pursh. Blue River (west of the main range). June. (394.)
G. RIVALE, L. Twin Lakes. July. (381.)
G. ROSSII, Seringe. Alpine, at 12,000 to 13,500 feet. (385.) (387.)
FRAGARIA VIRGINIANA, Ehrh. June. (402.)
FALLUGIA PARADOXA, Torr. San Luis Valley. Fruiting in September. (398.)
SIBBALDIA PROCUMBENS, L. South Park; 11,000 feet. July. (403.)
POTENTILLA GLANDULOSA, Lindl. Apex. June. (379.)
P. RIVALIS, Nutt. South Park. July.. (373.)
P. PENNSYLVANICA, L. South Park, July; Twin Lakes, August. (374.) (375.)
P. HIPPIANA, Lehm. Dry plains in South Park. July. (367) (209.)
P. PLATTENSIS, Nutt. Twin Lakes and Blue River. (376.) (377.)
P. DISSECTA, Pursh. Mosquito Pass and South Park. June and July. (371.) (378.)
P. GRACILIS, Dougl. South Park. July. (368.) (372.)
P. HUMIFUSA, Nutt. Georgetown. June. 8,500 feet elevation. (365.)
P. NIVEA, L. (366.)
P. FRUTICOSA, L. South Park. July. (383.)
P. ANSERINA, L. South Park. July. (382.)
IVESIA GORDONI, T. & G. Buffalo Peak in South Park. 12,000 feet altitude. (386.)
ROSA BLANDA, Ait. Twin Lakes. July. (391–393.)
R. ARKANSANA, Porter. (*Syn. Flora of Colorado*, p. 38.) Twin Lakes. July. Growing in company with *R. blanda*. (390.)
AMELANCHIER CANADENSIS, T. & G., var. ALNIFOLIA, T. & G. (396

SAXIFRAGACEÆ.

SAXIFRAGA HIRCULIS, L. Twin Lakes. (799.)
S. SERPYLLIFOLIA, Pursh. Silver-Heels Mountains; altitude, 12,000 feet. (799 *bis.*)

S. FLAGELLARIS. Willd. South Park; altitude, 12,000 feet. (797.)
S. BRONCHIALIS, L. Twin Lakes, South Park, Clear Creek. July to August. Rocky places. (802.)
S. PUNCTATA, L. (*S. æstivalis*, Fisch.) Twin Lakes. Moist, shady ravines. Altitude, 11,000 feet. (803.)
S. NIVALIS, L. Under this I would merge *S. Virginiensis* Michx. I can see no propriety whatever in keeping up the distinction. South Park. July. (795.)
S. NIVALIS, L., var. GRAYII. Exactly 193 of the Parry, Hall, and Harbour collection. Dr. Gray states that the "limits between *S. nivalis*, *Virginiensis*, and *integrifolia* are not obvious." For this variety I anticipate, (as we know it better,) the rank of a distinct species. Half-Moon Creek; altitude, 11,000 feet. August. (796.)
S. ABSCENDENS, L. 196 of the Parry, Hall, and Harbour collection. From the old leaves at the roots of my specimen I incline to regard this as biennial, though the roots do have an annual appearance. (798.)
TELLIMA TENELLA, Hook. & Benth. (evidently, though quite too young). Blue River, near Breckenridge (west of the main range). (800.) (982.)
HEUCHERA PARVIFOLIA, Nutt. South Park and Clear Creek. (804,) (805.)
PARNASSIA PARVIFOLIA, DC. Valley of the Upper Arkansas River. August. (63.) Twin Lakes. (64.)
P. FIMBRIATA, Banks. Twin Lakes. August. (65.)
JAMESIA AMERICANA, T. & G. Clear Creek Cañon, Grant post-office. Rocky ledges. (68.)
RIBES HIRTELLUM, Michx. South Park. (8.) (11.)
R. LEPTANTHUM, Gray. Poncho Pass. (4.) (7.)
R. LACUSTRE, Poir., var. SETOSUM, Gray. South Park. July. (3.)
R. CEREUM, Dougl. South Park. June. (6.)
R. AUREUM, Pursh. San Luis Valley. (10.)
R. WOLFII, Rothrock (in American Naturalist, June, 1874). (*R. sanguineum*, Pursh., var. *variegatum*, Watson, King's Report, vol. v, p. 100.) 2 to 4 feet high. Neither prickly nor spiny. Moderately branching. Young branches light-brown; minutely glandular-pubescent; somewhat angular by two ridges continued from the edges of the expanded bases of the petioles above. Branches of the previous year ashy-gray, with a deciduous epidermis, which, on being shed, shows the bark underneath dark-brown.

Leaves cordate-orbicular, deeply 5-cleft; lobes rather obtuse, unequally serrate, though hardly doubly-serrate (average diameter of the largest leaves 2 to 2½ inches; depth of sinus at base in largest leaves, ½ inch); slightly viscid; under surface with a few glandular hairs, pale-green; upper surface smoother and deeper green; petioles *in fully developed leaves* from 1 to 1⅓ inches long, margined by a continuation of the veins of the blade, expanded at base and becoming semi-amplexicaul, frequently *strongly* pectinately ciliate and glandular.

Peduncles 1 to 2 inches long, decidedly glandular-pubescent, 4 to 10-flowered; bracts ovate-spatulate, obtuse, yellowish-white (occasionally verging towards red), 1 to 1½ lines long and 1 line shorter than the pedicels, which are a little longer than the flower.

Sepals red, lanceolate, obtuse, 1½ lines long, *never reflexed*; petals red, ovate-spatulate, half as long as the sepals, equaling the stamens; styles, two, distinctly conical from the top of the ovary, red for half

their length, parted to or below the middle, recurved; stigmas slightly capitate.

Young fruit strongly glandular hairy, but never prickly, becoming smoother with age; mature fruit maroon or reddish-purple, globose, three-eighths of an inch in diameter, few to many-seeded, edible; seeds distinctly wing-margined, with the inner coat, as seen through the gelatinous covering, longitudinally dotted.

It will be seen that this plant approaches both *R. glutinosum*, Benth., and *R. sanguineum*, Pursh., though its nearer affinity is with the latter. It is distinguished from the former in being fewer-flowered, having shorter racemes, and a rounder berry; and from the latter by its shorter racemes, relatively shorter bracts and longer pedicels, and erect calyx-lobes. It may prove to be a mere variety of *R. sanguineum*, though I think it sufficiently distinct to bear the name of its zealous discoverer, Professor Wolf.

Habitat.—Rocky places, at Twin Lakes and Mosquito Pass; at an altitude of from 10,000 to 11,000 feet.

TILLÆA ANGUSTIFOLIA, Nutt. Twin Lakes. (972, 326.)

CRASSULACEÆ.

SEDUM RHODIOLA, DC. South Park. (771.)
S. RHODANTHUM, Gray. (769.) (326.)
S. STENOPETALUM, Pursh. South Park. July.

HALORAGEÆ.

HIPPURIS VULGARIS, L. Twin Lakes, San Luis Valley. Not rare.
CALLITRICHE VERNA, L. Twin Lakes. Standing water. (314.)
C. AUTUMNALIS, L. Rio Grande at Loma. (987.)

ONAGRACEÆ.

EPILOBIUM ANGUSTIFOLIUM, L. Oro City. August. Altitude, 9,600 feet. (143.)

E. LATIFOLIUM, L. Twin Lakes. Altitude, 9,600 feet. Wet, rocky places. August. We have in the collection the extreme forms of broadly-lanceolate and narrow, lanceolate-linear leaves, with all gradations between. (142.)

E. TETRAGONUM, L. Twin Lakes. July. Altitude, 9,600 feet. (145, 153, 154. 156.) The form 154 is a fair *E. coloratum*, Muhl.; but I am heartily in accord with Mr. Watson in uniting both under the same species. From the abundant material at my command, I cannot assign a specific distinction to their points of contact.

E. PALUSTRE, L., var. *β.* ALBIFLORUM, in T. & G. (156 *bis.*) These specimens were intermixed with 156 in the retained collection. So plainly marked were their characteristics; *i. e.*, leaves entire, lance-linear, obtuse, stem few-flowered, flowers almost white, capsule hoary, at first almost sessile, afterward with a long pedicel, that I am half inclined to keep the form distinct as a species. Except for its manifesting little or no tendency to branch, it would be exactly *E. rosmarinifolium* of Pursh, Fl. 1, p. 259. South Park. Altitude, 9,900 feet.

E. PANICULATUM, Nutt. Saguache, San Luis Valley. Altitude, 6,400 feet. September.

ŒNOTHERA BIENNIS, L. Saguache, San Luis Valley. Altitude, 6,400

feet. (131, 141.) Also a poor specimen from Loma on the Rio Grande (127) is probably referable here. September.

Œ. PINNATIFIDA, Nutt. Denver. June. 5,300 feet. (125, 130.)

Œ. TRILOBA, Nutt. Denver, June; South Park, July. Altitude, 5,000 to 10,000 feet. (124, 123, 121.)

Œ. CÆSPITOSA, Nutt. South Park. June. 9,900 feet. (132.)

Œ. CORONOPIFOLIA, T. & G. Twin Lakes. Altitude, 9,500 feet. July. (126.)

GAYOPHYTUM RAMOSISSIMUM, T. & G. June and July. Georgetown and South Park. Altitude, 8,000 to 10,000 feet. (150, 146, 147.)

GAURA COCCINEA, Nutt. Common. Open, dry grounds. (160, 161.) June to August.

G. COCCINEA, Nutt. Glabrous form. Valley of the Upper Arkansas. September. (159.)

LOASACEÆ.

MENTZELIA NUDA, T. & G. Valley of the Upper Arkansas River. September. (764, 765.)

M. ALBICAULIS, Dougl. Denver. June. (768.)

UMBELLIFERÆ.

SIUM LINEARE, Michx. San Luis Valley. September. In fruit only. (730.)

S. ANGUSTIFOLIUM, L. In warm springs of San Luis Valley; water about 80°. (732.)

CYMOPTERUS ALPINUS, Gray. Top of Griffith's Peak, near Georgetown; altitude, 11,500 feet. (725, 731.)

C. GLOMERATUS, DC. Denver. June.

MUSENIUM TRACHYSPERMUM, Nutt. Apex. June. (726.)

LIGUSTICUM APIIFOLIUM, Benth. & Hook. Twin Lakes. August. (717, 718.)

L. MONTANUM, Gray. Clear Creek Cañon. Union Creek Pass, at 12,000 feet. (716, 719, 720, 724.)

THASPIUM TRIFOLIATUM, Gray. South Park. June. (727.)

ARCHANGELICA GMELENI, DC. Twin Lakes. August. (712.)

ARCHEMORA FENDLERI, Gray. Twin Lakes. July. (723.)

HERACLEUM LANATUM, Michx. Twin Lakes. (713.)

ARALIACEÆ.

ADOXA MOSCHATELLINA, L. Mountain-ravines, at 11,000 feet.

CORNACEÆ.

CORNUS PUBESCENS, Nutt.(?) Valley of the Rio Grande at Loma. Too old for satisfactory specimens. (79.)

CAPRIFOLIACEÆ.

LINNÆA BOREALIS, Gronov. Twin Lakes, at 11,000 to 12,000 feet. July.

SYMPHORICARPUS OREOPHILUS, Gray. South Park. (18.)

LONICERA INVOLUCRATA, Banks. South Park. July. (19.)

SAMBUCUS RACEMOSA, L., var. PUBENS, Watson. Clear Creek Cañon. June.

RUBIACEÆ.

GALIUM TRIFIDUM, L. San Luis Valley. (15, 16.)
G. BOREALE. Common and variable. (17.)

VALERIANACEÆ.

VALERIANA DIOICA, L., var. SYLVATICA, Watson. South Park, at 10,000 feet. (773.)
V. EDULIS, Nutt. (*V. ciliata*, T. & G.) South Park. June and July. Either root or stem-leaves may be entire or pinnately parted with any degree of division between. Valerian-odor is very strong in this species on boiling. (774.)

COMPOSITÆ.

[For the identification of the plants of this order, I am indebted to Prof. Asa Gray. Though the names were indicated in great haste, they doubtless are to be depended upon, and it is needless to say that, for any errors, if such there be, I alone am responsible.—J. T. R.]

PECTIS ANGUSTIFOLIA, Torr. (467.)
LIATRIS SCARIOSA, Willd. Dwarfed. Trout Creek. (458.)
BRICKELLIA GRANDIFLORA, Nutt. Valley of the Upper Arkansas River and Trout Creek. (422, 423.)
NARDOSMIA SAGITTATA, Hook.(?) No leaves, and therefore impossible to determine the species with certainty. Near Breckenridge. Alpine. (580.)
MACHÆRANTHERA CANESCENS, Gray. (497, 499, 511, 507.) 420 and 455, a dwarf and singular variety, collected also by Porter and Canby.
M. TANACETIFOLIA, Nees. (854, 491, 505.)
ASTER ADSCENDENS, Lindl. (522.) Form 523, between 522 and *A. falcatus*, Lind.; 524, var. *ciliatifolius*, T. & G., which is 419 of Parry's collection; 525, a curious form; 526, var.; 492, a very slender form; 509 is probably referable to *A. adscendens*.
A. FALCATUS, Lindl. Valley of the Upper Arkansas River. (488, 501.)
A. DOUGLASII, Lindl.(?) San Luis Valley. (500.)
A. SALSUGINOSUS, Richards. (486, 504, 516.) 520 is a very alpine form from Union Creek Pass.
A. PAUCIFLORUS, Nutt. San Luis Valley. (508.)
A. FENDLERI, Gray. (510.)
ERIGERON COMPOSITUM, Pursh. South Park. July. (493.)
E. COMPOSITUM, Pursh, var. a glabrate form, E. PEDATUM, Nutt. (496.)
E. UNIFLORUM, L., var. South Park. (494, 515.)
E. GRANDIFLORUM, Hook., var. ELATUS, Gray. Mosquito. (487, 490.)
E. MACRANTHUM, Nutt. Verging toward *E. grandiflorum*. Collected also by Parry. Union Creek Pass. (519.)
E. BELLIDIASTRUM, Nutt.(?) Too young to be sure. Denver. June. (513.)
E. PUMILUM, Nutt. Denver. June. (514.)
E. DIVERGENS, T. & G. (503.)
E. URSINUM, D. C. Eaton. South Park. July. (495.)
E. FLAGELLARE, Gray. Apex. June. (518.)
E. ARMERIÆFOLIUM, Turcz. Twin Lakes. July. (527.)
TOWNSENDII SERICEA, Hook. Kit Carson. (419.) Var. (416). Georgetown.

T. STRIGOSA, Nutt. Valley of Upper Arkansas River. (517, 853.)
T. SCAPIGERA, D. C. Eaton (??). Heads sessile. Will probably rank as a new species, for which Gray proposes *T. Rothrockii*. South Park. July. (417, 418, 875.)
GUTIERREZIA EUTHAMIÆ, T. & G. South Park. (411, 412, 414, 415.) 410, the same, verging, however, toward *G. microphylla*. 473 is a depauperate scabrous form of *Euthamiæ*. South Park.
SOLIDAGO VIRGA-AUREA, L., var. HUMILIS, Gray. South Park. (404, 409.)
S. VIRGA-AUREA, L., var. ALPINA, Big. Half-Moon Creek; altitude, 12,000 feet. (407.)
S. NEMORALIS, Ait. (408.)
S. MISSOURIENSIS, Nutt. Twin Lakes. July. (405.)
S. CANADENSIS, L., var.(?) Twin Lakes, at 10,000 feet. (406.)
BIGELOVIA GRAVEOLENS, Gray. (452.)
B. PARRYI, Gray. Twin Lakes. (453.)
B. BIGELOVII, Gray. Valley of Upper Arkansas River. (454.)
B. DOUGLASSII, var. TORTIFOLIA, Gray, *rer.* (413, 447.) 478 broad-leaved.
APLOPAPPUS SPINULOSUS, DC. San Luis Valley. (470.)
A. INULOIDES, T. G. Union Creek Pass. July. (472, 579.)
A. NUTTALLII, T. & G. (465.)
A. MACRONEMA, Gray. Twin Lakes. (451.)
A. PARRYI, Gray. Twin Lakes. Alpine. (471.)
A. LANCEOLATUS, T. & G. San Luis Valley. (474, 485.) Between A. *Vaseyi* and *A. tenuicaulis*, D. C. Eaton. This form will probably destroy the last-named species.
CHRYSOPSIS VILLOSA, Nutt., var. FOLIOSA, Gray. South Park. July. (552.)
C. VILLOSA, Nutt., var. HISPIDA. (555.) (464, var.)
BACCHARIS SALICINA, T. & G. (456.)
FRANSERIA HOOKERIANA, Nutt. San Luis Valley. (56, 534.)
HELIOMERIS MULTIFLORA, Nutt. San Luis Valley. September. (551, 554.)
ZINNIA GRANDIFLORA, Nutt. (468.)
WYETHIA ARIZONICA, Gray. (556.)
RUDBECKIA HIRTA, L. (apparently). South Park and Trout Creek. (549, 550.)
HELIANTHUS PETIOLARIS, Nutt. Valley of the Upper Arkansas. (553.)
H. LENTICULARIS, Dougl. Valley of the Upper Arkansas. September. (547.)
H. NUTTALLII, T. & G. With broader leaves. Saguache. (548.)
HELIANTHELLA UNIFLORA, T. & G. South Park. July. (546.)
BIDENS TENUISECTA, Gray. Valley of the Upper Arkansas. (544.)
XIMENESIA ENCELIOIDES, Cav. San Luis Valley. September. (421.)
GAILLARDIA ARISTATA, Pursh. South Park. (483.)
CHÆNACTIS DOUGLASII, Hook & Arn. Kenosha range and South Park. July. (481.) 482 is dwarfed.
HYMENOPAPPUS LUTEUS, Nutt. Rio Grande at Loma. (541.) (576, 870, probably *luteus*.) 475 either *luteus* or variety of *tenuifolius*, Pursh.
H. FLAVESCENS, Gray. (542.)
ACTINELLA RICHARDSONII, Nutt. South Park. (484.)
A. ACAULIS, Nutt. South Park, at 12,000 feet. (457.)
A. GRANDIFLORA, T. & G. Common in alpine regions. (578.)
ACHILLEA MILLEFOLIUM, L. Certainly indigenous about South Park and Twin Lakes. (480.)

ARTEMESIA DRACUNCULOIDES, Pursh. Twin Lakes. (530, 531.)
A. CANADENSIS, Michx. (532.)
A. TRIDENTATA, Nutt. Twin Lakes. (431.)
A. LUDOVICIANA, Nutt. Valley of the Upper Arkansas River and San Luis Valley. (529.) (Var. 429.)
A. LUDOVICIANA, Nutt., var. MEXICANA, forma TENUIFOLIA, Gray. Remarkable; very likely a species. San Luis Valley. September. (539.)
A. FRIGIDA, Willd. Along with *Aphyllon fasciculatum*, T. & G. Parasitic attachments from the latter, uniting the rootlets of the two. I do not recollect to have seen this *Aphyllon* growing, except in the company of the *Artemesia*. (469.)
A. SCOPULORUM, Gray. South Park. Alpine. (430.)
A. BOREALIS, Pallas. South Park. Alpine. (535, 536.)
GNAPHALIUM STRICTUM, Gray. San Luis Valley and Twin Lakes. (425, 427.) 423 depauperate.
G. PALUSTRE, Nutt. San Luis Valley. (426, 428.)
ANTENNARIA CARPATHICA, R. Br. (208, 433, 434.)
A. DIOICA, Gært. (435–445 all forms of the same species.) Common.
THELESPERMA GRACILE, Gray. Denver. June. (540, 543.)
SENECIO SPARTIOIDES, T. & G. Valley of the Upper Arkansas River. September. (589.)
S. LUGENS, Richards, var. FOLIOSUS, Gray. Twin Lakes and South Park. (567.) (587 the same, but less tomentose.)
S. TRIANGULARIS, Hook. Twin Lakes. July. (563.)
S. ANDINUS, Nutt. Twin Lakes. (564, 565.)
S. AUREUS, L., var. BOREALIS, T. & G. Verging toward *croceus*. Gray. (558, 566, 581.) (582, var. *borealis*, with round radical leaves. 585 same as form collected by Professor Gray at Empire. 586 nearly 582.)
S. AUREUS, L., var. ALPINUS, Gray. Buffalo Peak. (577.)
S. AUREUS, L., var. WERNERIÆFOLIUS, Gray. (588.)
S. CANUS, Hooker, var. Union Creek Pass. (559.)
S. CERNUUS, Gray. Twin Lakes. July. (583.)
S. FENDLERI, Gray. Twin Lakes. (557.)
S. EREMOPHILUS, Richards. Narrow-leaved. San Luis Valley. (561.)
S. FREMONTII, T. & G. (571, 572, 576.) Common at 11,500 feet and upward.
S. SOLDENELLA, Gray. South Park; altitude, 12–13,000 feet. (573, 575.)
S. BIGELOVII, Gray, var. MONOCEPHALA. Twin Lakes. (587, 674.)
S. LONGILOBUS, Benth. (673.)
VILLANOVA CHRYSANTHEMOIDES, Gray. Twin Lakes. Cottonwood Creek. (479, 545.)
TETRADYMIA CANESCENS, DC., var. INERMIS, Gray. San Luis Valley. (449, 855.)
ARNICA ALPINA, Laest., var. ANGUSTIFOLIA, Vahl. Clear Creek. June. (569.)
A. FOLIOSA, Nutt. Twin Lakes. July. (568.)
A. CORDIFOLIA, Hooker. Clear Creek. June. (570.)
CNICUS PARRYI, Gray. Twin Lakes. (460.)
C. DRUMMONDII, T. & G. Acaulescent. Twin Lakes. (461.)
C. DRUMMONDII, T. & G. Caulescent. (462.)
C. ARIZONICUS, Gray. (463.)
MALACOTHRIX FENDLERI, Gray. Bowlder. (466.)
CREPIS RUNCINATA, T. & G. San Luis Valley. (664.)

MACRORYNCHUS. (667.) Too young; probably *troximoides*, T. & G., or possibly *Troximon glaucum*, Nutt. South Park.
M. TROXIMOIDES, T. & G., var. PARRYI, Gray. (66, 668.)
STEPHANOMERIA MINOR, Nutt. Trout Creek. (671, 672.)
TROXIMON PARVIFLORUM, Nutt., large. South Park and San Luis Valley. (665, 666.)
MULGEDIUM PULCHELLUM, Nutt. Cottonwood Creek. (670.)

CAMPANULACEÆ.

CAMPANULA UNIFLORA, L. Grant post-office. August. (751.)
C. ROTUNDIFOLIA, L. South Park; altitude, 10,000 feet. August. (752.)
C. LANGSDORFFIANA, Fisch. South Park and mountains of Central Colorado; generally at 10–11,000 feet.

ERICACEÆ.

VACCINIUM CÆSPITOSUM, Michx. South Park. June. (741.)
ARCTOSTAPHYLOS UVA-URSI, Spreng. Common in dry gravelly soil at 10,000 feet. (742.)
PYROLA SECUNDA, L. Moist shady ravines. Twin Lakes, at 10,500 feet. (739.)
P. MINOR, L. Alpine ravines, in shady places, at 10,500 feet. (740.)
P. ROTUNDIFOLIA, L., var. ULIGINOSA, Gray. Twin Lakes, at 9,500 feet. (738.)
MONESES UNIFLORA, Gray. Twin Lakes. (743.)

PLANTAGINACEÆ.

PLANTAGO PATAGONICA, Jacq., var. GNAPALIOIDES, Gray. Denver. June.

PRIMULACEÆ.

PRIMULA PARRYI, Gray. Mountain-ravines, at 10–12,000 feet. July. (734.)
P. ANGUSTIFOLIA, Torr. South Park; in alpine regions. July. (736.)
P. FARINOSA, L. South Park. Common. (737.)
ANDROSACE SEPTENTRIONALIS, L. (356, 358, 359.)
DODECATHEON MEADIA, L. South Park; at 10–11,500 feet.

OROBANCHACEÆ.

APHYLLON FASCICULATUM, T. & G. Apex and South Park. Parasitic on *Artemesia frigida*. (52.)

SCROPHULARIACEÆ.

COLLINSIA PARVIFLORA, Dougl. Apex. June. (328.)
PENSTEMON GLABER, Pursh. Denver, Col. June. Sterile filament densely bearded. Comparing this with my specimen from the Parry, Hall, and Harbour collection, I find that in both the anthers open along their entire length. (299.)
P. CÆRULEUS, Nutt. Apparently the plant described by Nuttall, though I have no authentic specimen with which to compare it. Extreme radical leaves distinctly petioled. Plains. June. (291.) (296.)

P. ACUMINATUS, Dougl. There is great variation in the margins of the calyx-lobes, and in the degree to which these are ciliated, in my specimens; also in the size and color of the flowers; yet the specimens, evidently, represent one and the same species. South Park and Clear Creek. June. (302.) (303.)

P. SECUNDIFLORUS, Benth. Probably too near to *P. acuminatus*, Dougl. South Park. August. Altitude, 10,000 feet. Sterile filament dilated and densely bearded with long orange-colored hairs, which are deepest in color at the apex of the filament. Bentham describes my specimen neatly. (DC., Prod., X, p. 325.) (300.)

P. ALBIDUS, Nutt. Sterile filament conspicuously bearded, and limb pubescent within. (292.)

P. HUMILIS, Nutt. Manifest tendency in the cauline leaves to become serrate; thyrse more lax; bracts larger; and altogether more luxuriant specimens than the one I have from collection of Parry, Hall, and Harbour, yet evidently the same species as their 387. South Park; high ground.

P. GLAUCUS, Grah., var. STENOPETALUS, Gray. (298.) Half-Moon Creek. Altitude, 11,000 feet. (297 is a *thin* form.)

P. CONFERTUS, Dougl., var. CŒRULEO-PURPUREUS, Gray. South Park. July. Altitude, 10,000 feet. (293.) (294.)

CHIONOPHILA JAMESII, Benth. High alpine. Specimens much more luxuriant than those on which the description was founded. (332.)

MIMULUS JAMESII, Torr. Denver. June. (312.)

M. LUTEUS, L. Twin Lakes. August. 10,000 feet. (313.)

M. LUTEUS, L., var. ALPINUS, Gray. Twin Lakes; in brooks. (313 *bis*.)

M. FLORIBUNDUS, Dougl. San Luis Valley. September. (311.)

GRATIOLA VIRGINIANA, L. San Luis Valley. September. (323.)

LIMOSELLA AQUATICA, L. Twin Lakes and San Luis Valley. (972, 973, 986.)

SYNTHYRIS PLANTAGINEA, Benth. Clear Creek and South Park. June. Altitude, 8–10,000 feet. (316.)

S. ALPINA, Gray. South Park.

VERONICA AMERICANA, Schweinitz. South Park. July. (336.)

V. ALPINA, L. Mosquito Pass. Alpine. July. (332.)

V. SERPYLLIFOLIA, L. (331.) (333 an exceedingly slender form from Twin Lakes.)

V. PEREGRINA, L. Twin Lakes. July. (330.)

V. PEREGRINA, L., var. DIFFUSA, Rothrock. Much more branched, and with leaves resembling the bracts entirely; flowers not seen; fruit like the last, of which it is evidently but a variety. San Luis Valley. On alkaline flats. (335.)

CASTILLEIA LINARIÆFOLIA, Benth. Twin Lakes. July; altitude, 9–10,000 feet. (288.)

C. PALLIDA, Kunth. South Park. 10,000 feet. July. (285.)

C. INTEGRA, Gray. Varies with leaves from linear to broadly lanceolate. (289, 290.) 287 is also probably a mere variety of the above.

ORTHOCARPUS LUTEUS, Nutt. Twin Lakes. Moist ground. Altitude, 9,500 feet.

RHINANTHUS CRISTA-GALLI, L. (321.)

PEDICULARIS GRŒNLANDICA, Retz. (*P. surrecta*, Benth.) South Park. 10–11,000 feet. (281.)

P. CRENULATA, Benth. South Park. (283.)

P. SUDETICA, Willd. South Park. (279.)

P. BRACTEOSA, Benth. Mosquito Pass. July. Galea evidently bidentate just under the apex. (284.)

P. RACEMOSA, Dougl. Twin Lakes. Altitude, 11,000 feet. (320.)
P. PARRYI, Gray. South Park. July. (232.)

VERBENACEÆ.

VERBENA BRACTEOSA, Michx. (?) Denver. June. (695.)

LABIATÆ.

LYCOPUS EUROPÆUS, L., var. San Luis Valley. September. (782.)
MENTHA CANADENSIS, L., var. GLABRATA, Benth. Valley of the Upper Arkansas. August. (778.)
DRACOCEPHALUM PARVIFLORUM, Nutt. Twin Lakes. (784.)
SCUTELLARIA RESINOSA, Torr. Denver. June. (780.)

From San Luis Valley, I have specimens (779) too old for satisfactory determination, but which I doubtfully refer to this species.

S. GALERICULATA, L. (?) San Luis Valley. September. Too old to be certain about. (781.)
STACHYS PALUSTRIS, L. San Luis Valley and Trout Creek. (783, 785.)
LAMIUM AMPLEXICAULE, L. Introduced into cultivated grounds at Mosquito. July. (777.)

BORRAGINACEÆ.

LITHOSPERMUM PILOSUM, Nutt. Grant post-office. July.
MERTENSIA OBLONGIFOLIA, DC. Apex. This, one of our best marked species of the genus, varies immensely in nearly every character. I find the unusual width of the filaments a reliable test; though often wider, they are seldom narrower than the anthers. (709*a*.)
M. SIBIRICA, Don. Sixteen inches high, leaves all ovate-lanceolate; lowest with petioles two inches long; stem-leaves with petioles one inch long, and upper ones sessile; calyx-lobes obtuse, one-third as long as the corolla-tube. (709*b*.)
M. PANICULATA, Don. These specimens evidently were an accidental species; doubtless intended for a good *M. Sibirica* (in the immediate company of which they were growing). A deep shade caused them to lengthen out, in search of sunlight, into the real paniculate form; to which I add, *Vidi vivam spontaneam*. (709.) The well-marked *M. brevistyla*, S. Watson, does not appear in this collection, which is remarkable.
M. ALPINA, Don. Montezuma. June. (710.)
ERITRICHIUM VILLOSUM, DC., var. ARETIOIDES, Hook. Mountain-tops, at 13,000 feet. June. (708.)
E. ANGUSTIFOLIUM, Torr. San Luis Valley. September. (704.)
E. CALIFORNICUM, DC. South Park and various places in Central Colorado. (689, 691, 692.)
E. GLOMERATUM, DC. Twin Lakes. 9,500 feet. July. (700, 702.)
E. CRASSISEPALUM, T. & G. Leaves almost linear-lanceolate, but the nutlets correspond exactly with 434 of the Hall and Harbour collection.
E. JAMESII, Torr. Denver. June. (696.)
ECHINOSPERMUM REDOWSKII, Lehm. Twin Lakes. July. (694, 705.)
E. DEFLEXUM, Lehm., var. FLORIBUNDAM, Watson. Twin Lakes. July. Fruit with a single marginal row of prickles, of which (in my specimens) each alternate prickle is one-half or one-third shorter than the others. (697.)

HYDROPHYLLACEÆ.

HYDROPHYLLUM VIRGINICUM, L. Apex. June. (83.)
PHACELIA POPEI, T. & G. in Pacific Railroad Survey, 2, p. 172, *t.* 10. Valley of the Upper Arkansas. (99.)
P. TANACETIFOLIA, Benth. Subalpine. (82.)
P. ——— (?) Loma on the Rio Grande. (80.)
ELLISIA AMBIGUA, Nutt. Denver.

POLEMONIACEÆ.

PHLOX DOUGLASSII, Hook. Too closely simulating *P. humilis*, Dougl., as distributed by Hall and Harbour, yet the latter is justly placed by Professor Gray under P. LONGIFOLIA, Nutt., recognizing as he does this same relationship. (681.)
P. CÆSPITOSA, Nutt., var. CONDENSATA, Gray. South Park. Alpine.
COLLOMIA LINEARIS, Nutt. Denver, June; South Park, July. (686, 687.)
C. LONGIFLORA, Gray. Denver. June. Flowers sometimes blue. (675. 677.)
C. GRACILIS, Dougl. Denver. June. (354.)
GILIA NUTTALLII, Gray. Oro City. July. (682.)
G. CONGESTA, Hook. Gray's Peak. South Park. July. 10–12,000 feet. (748, 749.)
G. NUDICAULIS, Gray. South Park.
G. AGGREGATA, Spreng. Dry plains and ridges of Central Colorado. June. (745.)
G. PINNATIFIDA, Nutt. Denver. June. (746.) 747 is a dwarfed form of the same from Twin Lakes.
POLEMONIUM CONFERTUM, Gray. 12,000 feet on mountains of Central Colorado. "Musk-scented" according to Professor Porter and others. (684.)
P. CÆRULEUM, Gray. 10,000 to 11,000 feet elevation on mountains of Central Colorado. Professor Wolf in his notes remarks, "with the odor of skunk." (683.)
P. HUMILE, Willd. Georgetown, at an elevation of 8,500 feet; in South Park reaching to 12,000 feet. (685.)

SOLANACEÆ.

SOLANUM TRIFLORUM, Nutt. South Park. Colorado Springs. (88.)

GENTIANACEÆ.

GENTIANA AMARELLA, L. Twin Lakes. July. (788.)
G. DETONSA, Fries. Twin Lakes and Trout Creek. Wet ground. (789.)
G. DETONSA, Fries, var. SIMPLEX, Gray. Almost exactly number 6359 of Bolander's California collection. So far as one may judge from rather scant material, I have but little hesitancy in following the indication of Professor Gray and considering it a mere variety, though its habit as well as habitat (found only on high, dry ground) are strikingly dissimilar to those of the typical form (794.) Exactly *G. barbellata*, Eng., which Mr. Coulter collected on Taylor River, Colorado Territory, in 1873. In the United States Herbarium, in the Department of Agriculture, I find Mr. Watson has named a more luxuri-

ant representative of the same form *G detonsa*, from Arizona, collected by the Wheeler expedition in 1872.

G. FRIGIDA, Haenke, var. ALGIDA, Griseb. Half-Moon Creek. 11,500–12,000 feet. August. (791.)

G. AFFINIS, Gris. Twin Lakes. August. 9,500 feet. (784.)

G. PARRYI, Eng. Red Mountain; 11,500 feet. (784 *bis*, 785.) On both these species the calyx tips and lobes, even of the same plant, vary immensely.

G. HUMILIS, Stev. June and July. (786, 787.)

FRASERA SPECIOSA, Dougl. South Park. June. (790.)

SWERTIA PERENNIS, L. Twin Lakes. August. (793.)

PLEUROGYNE ROTATA, Griseb. Twin Lakes. August. (792.)

APOCYNACEÆ.

APOCYNUM ANDROSÆMIFOLIUM, L. Twin Lakes. Alpine brooks. July.

NYCTAGINACEÆ.

MIRABILIS MULTIFLORA, Gray. Saguache, in San Luis Valley. September. (816, 817.)

OXYBAPHUS ANGUSTIFOLIUS, Sweet. Half-Moon Creek and valley of the Upper Arkansas River. August. (810, 811, 814.)

ABRONIA CYCLOPTERA, Gray. Valley of the Upper Arkansas River. September. (809, 815.)

A. FRAGRANS, Nutt. Half-Moon Creek. August. Denver. June. (808, 812, 813.)

CHENOPODIACEÆ.

CHENOPODIUM HYBRIDUM, L. Saguache. (257.)

C. OLIDUM, S. Watson. (Proc. Am. Acad., vol. ix.) Twin Lakes. Altitude, 9,500 feet. August. (258.)

C. FREMONTII, S. Watson. Twin Lakes. August. (253.)

C. LEPTOPHYLLUM, (Nutt. in Herb.) *C. album*, var. *leptophyllum*, Moquin. Prod., 13, 2, p. 71. Valley of the Upper Arkansas River and San Luis Valley. September. (263, 264.)

BLITUM CAPITATUM, L. Georgetown and Twin Lakes. 6–10,000 feet. (269, 271.)

B. GLAUCUM, Koch. Salt-works in South Park, San Luis Valley. August to September. (254, 260, 261.)

B. RUBRUM, Reichenb. Hot springs in San Luis Valley (water about 80°). September. (272.)

B. RUBRUM, var. HUMILE. San Luis Valley. (873.)

MONOLEPIS CHENOPODIOIDES, Moquin. Twin Lakes. July. Altitude, 9,500 feet.

ATRIPLEX CANESCENS, Nutt. Valley of the Upper Arkansas River. (268.)

A. PATULA, L., var. San Luis Valley. (259, 262, 278.)

A. WOLFII, S. Watson (*sp. nov.*, Proc. Am. Acad., vol. ix, p. 112). San Luis Valley. (277.)

EUROTIA LANATA, Moquin. (537.)

CORISPERMUM HYSSOPIFOLIUM, L. (37, 866, 872.)

SUÆDA DEPRESSA, Ledeb. Salt-works in South Park. (267.) 276 is

var. *erecta*, Watson. The two forms are certainly different enough, but Mr. Watson assures me they may be connected.

SARCOBATUS VERMICULATUS, Torr. San Luis Valley. Common there and known as "chico." (265, 266.)

AMARANTACEÆ.

AMARANTUS RETROFLEXUS, L. Twin Lakes. August. (274.)
A. ALBUS, L. Valley of the Upper Arkansas River. September. (275.)

PARONYCHIEÆ.

PARONYCHIA PULVINATA, Gray. South Park, at 12–13,000 feet. (46.)

POLYGONACEÆ.

[Names furnished by Mr. Sereno Watson, Cambridge.]

ERIOGONUM UMBELLATUM, Torr. South Park. Common. (24.)
E. WRIGHTII, Torr. Valley of the Upper Arkansas River. (22.)
E. FLAVUM, Nutt., var. Valley of the Upper Arkansas River. (25.)
E. FLAVUM, Nutt. South Park. Twin Lakes. (26, 28.)
E. PAUCIFLORUM, Pursh. Sulphur Spring, South Park, Colorado Territory. (27.)
E. CERNUUM, Nutt. Twin Lakes. (23.)
E. ALATUM, Torr. (806.)
OXYRIA DIGYNA, Campd. South Park. (42.)
RUMEX LONGIFOLIUS, DC. Twin Lakes, Saguache. (29, 30.)
R. SALICIFOLIUS, Weinm. San Luis Valley. (31.)
R. MARITIMUS, L. San Luis Valley. September. (32.)
POLYGONUM AVICULARE, L. Twin Lakes. San Luis Valley. (34, 35, 41.)
P. ERECTUM, L. Valley of the Upper Arkansas River. (39.)
P. IMBRICATUM, Nutt. South Park. (36.)
P. AMPHIBIUM, L. Common.
P. AQUATICUM, Gray. (38.)
P. PENNSYLVANICUM, L. San Luis Valley. (40.)
P. VIVIPARUM, L. South Park. (43.)
P. BISTORTA, L. South Park. (44.)

ELEAGNACEÆ.

SHEPHERDIA CANADENSIS, Nutt. Georgetown. (58.)
ELEAGNUS ARGENTEA, Pursh. Twin Lakes, at 9,500 feet.

LORANTHACEÆ.

ARCEUTHOBIUM AMERICANUM, Nutt. Near Breckenridge, at 10–11,000 feet on *Pinus contorta*.

EUPHORBIACEÆ.

EUPHORBIA MONTANA, Engelm. (85.)
E. SERPYLLIFOLIA, Pers. San Luis Valley on alkaline soil. (86, 87.)

URTICACEÆ.

URTICA BREWERI, S. Watson, *sp. ined.* (72.)
U. GRACILIS, Ait. San Luis Valley. (71.)
HUMULUS LUPULUS, L. Mountains east of the Arkansas River. (53.)

CUPULIFERÆ.

QUERCUS UNDULATA, Torr. Poncho Pass. (818.)

BETULACEÆ.

BETULA OCCIDENTALIS, Hook. Georgetown. (841.)
B. GLANDULOSA, Michx. Twin Lakes, Blue River. (838, 839.)
ALNUS INCANA, Willd., var. GLAUCA, Ait. (840.)

SALICACEÆ.

SALIX NIGRA, Marsh., var. AMYGDALOIDES, Anders. Denver. June. (823.)
S. LONGIFOLIA, Muhl., var. ARGYROPHYLLA, Nutt., forma ANGUSTISSIMA, Anders. Twin Lakes and Denver. (822.)
S. LIVIDA, Wahl., var. OCCIDENTALIS, Gray(?). (821.)
S. CORDATA, Muhl. Georgetown. June. South Park. (825, 826.)
S. GLAUCA, L., var. SERICEA, Anders. (819, 829.) Exactly 523 of Hall and Harbour.
S. RETICULATA, L. Half-Moon Creek, at 13,000 feet. (830.)
POPULUS TREMULOIDES, Michx. South Park. (832.)
P. BALSAMIFERA, L., var. CANDICANS, Gray. Denver; and common elsewhere along streams. (835.)
P. BALSAMIFERA, L., var. ANGUSTIFOLIA, Watson. San Luis Valley. Denver. (833, 834.)
P. ANGULATA, Ait. Denver. (831.)

CONIFERÆ (named by Josiah Hoopes).*

PINUS CONTORTA, Dougl. South Park. (842.) Twin Lakes. (843.)
P. FLEXILIS, James. Twin Lakes. (845.)
P. BALFOURIANA, Mur., (syn. P. ARISTATA, Engl.) Breckenridge; high ground. (847.) South Park. (848.)
P. MONOPHYLLA, Torr.† Valley of the Upper Arkansas. (849.)
P. PONDEROSA, Dougl. Tree 40 feet high and 2 feet in diameter. Conjos Creek. 11,000 feet altitude. (983.)
ABIES DOUGLASII, Lindl. Twin Lakes. (846.)
JUNIPERUS VIRGINIANA, L. A form peculiar to the Rocky Mountain range, with pale, glaucous leaves. Valley of the Upper Arkansas River. (844.)

Also cone of the *Abies Menziesii*, Lindl.; and an immature cone of *Pinus*(?).

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* See remarks in first part of report.

† I here defer to Hoopes in naming this tree. It is more usually now, *I think*, regarded as *P. edulis*, Engelm.

TYPHACEÆ.

SPARGANIUM EURYCARPUM, Engelm. Swamps of San Luis Valley. (956.)
S. SIMPLEX, Huds. Twin Lakes. (957.) Swamps of San Luis Valley. (958.)

NAIADACEÆ.

POTAMOGETON GRAMINEUS, L., var. HETEROPHYLLUS, Fries. South Park, at 10,000 feet. No mature fruit. (961.)
P. PERFOLIATUS, L., var. LANCEOLATUS, Robbins(?). Twin Lakes. (760.)
P. MARINUS, L. Twin Lakes and San Luis Valley. (955.)
P. PECTINATUS, L. (959.)

ALISMACEÆ.

TRIGLOCHIN PALUSTRE, L. South Park. (952.)
T. MARITINUM, L. Alkaline plains of South Park and San Luis Valley. (942, 951.)

ORCHIDACEÆ.

HABENARIA HYPERBOREA, R. Br. Twin Lakes. (965.)
H. DILATATA, Gray. This and the preceding are doubtless distinct species, and I have endeavored to act upon this belief. I confess, however, to my inability to find a real constant difference that might stand as a specific test. Even the careful figures of Mr. Watson do not always decide. I place more dependence on the hooded posterior sepal that Mr. Watson points out than on the measurements, though even this seems a mere question of degree. The fact may be worth noting that most of these specimens grew in the same place, and side by side.
SPIRANTHES ROMANZOFFIANA, Cham. Twin Lakes. (963, 964.)

IRIDACEÆ.

IRIS TOLMIEANA, Herb. Bot. Beechey. South Park. Common. (967.)
SISYRINCHIUM BERMUDIANA, L. South Park. (945.) From Denver there are one or two dwarfed albinos of this species.

LILIACEÆ.

ZYGADENUS GLAUCUS, Nutt. (950.)
Z. NUTTALLII, Gray. Apex. June. (944.)
LILIUM PHILADELPHICUM, L.
SMILACINA STELLATA, Desf. South Park. July. (953.)
CALOCHORTUS GUNNISONI, Watson. Central Colorado. (941.)
LLOYDIA SEROTINA, Reich. South Park. (943.)
LEUCOCRINUM MONTANUM, Nutt. Clear Creek Cañon. (944.)
ALLIUM CERNUM, Roth. South Park. (948.)
A. RETICULATUM, Fraser. Denver. June. (946.)
A. MUTABILE, Michx. South Park. (947.)

JUNCACEÆ.

LUZULA SPADICEA, DC., var. PARVIFLORA, Ledeb. (923.)
L. SPICATA, Desv. (922.)

JUNCUS BALTICUS, Deth. Denver and elsewhere. Common in wet places. (914.)
J. CASTANEUS, Sm. Mosquito Pass. (933.)
J. BUFONIUS, L. San Luis Valley. (929.)
J. LONGISTYLIS, Torr. South Park. Denver. Twin Lakes. (913, 915, 931, 932, 936.)
J. TRIGLUMIS, L. Twin Lakes. (937.)
J. NODOSUS, L., var. MEGACEPHALUS, Torr. San Luis Valley. (911.)
J. MERTENSIANUS, Bong. Mosquito Pass. Twin Lakes. (912, 934, 935.)
J. XIPHIOIDES, E. Mey., var. MONTANUS, Engelm.

CYPERACEÆ.

CYPERUS INFLEXUS, Muhl. San Luis Valley. (924.)
C. SCHWEINITZII, Torr.
ELOCHARIS PALUSTRIS, R. Br. San Luis Valley. (927, 977.)
E. ACICULARIS, R. Br. Alkaline flats of San Luis Valley. Bristles twice as long as the achenium. (928.)
SCIRPUS PAUCIFLORUS, Lightfoot. Twin Lakes. (926.)
S. PUNGENS, Vahl.(?) Denver. (925.)
S. VALIDUS, Vahl. San Luis Valley. (930.)
ERIOPHORUM POLYSTACHYON, L. Twin Lakes. (968.)
KOBRESIA SCIRPINA, Willd.

CARICES.

BY S. T. OLNEY, PROVIDENCE, R. I.

CAREX GYNOCRATES, Wormsk., Drej. Rev., p. 16, 1841. Mosquito. (1000.)
C. LYONI, Boott, Hook., Fl. Bor. Am., 2, p. 209, 1840. Summit ot Hall's Gulch. July. (1001.)
C. SCIRPOIDEA, Michx., 2, p. 271, 1803. South Park, Mosquito. (1002.)
C. OBTUSALA, Lilj., in Act. Hol., p. 69, 1793. South Park. (1003.)
C. POLYTRICHOIDES, Muhl., in Willd., Sp. Pl., 4, 213, 1805. Twin Lakes. (1004.)
C. RUPESTRIS, All., Fl. Ped., 2, p. 292. (1005.) A single specimen, with *C. Lyoni*.
C. HOOKERIANA, Dew., 29, 248, 1836. South Park. (1006.)
C. GAYANA, Desv., Fl. Ch., 6, p. 205, 1853. Twin Lakes. (1007.)
C. SICCATA, Dew., 10, p. 278, 1826. Mosquito. (1008.) South Park. Too young. (1009.)
C. DOUGLASSII, Boott (!), in Hook., Fl. Bor. Am., 2, 213, 1840. Denver. The sterile plant. (1010.)
C. DOUGLASSII, Boott (!) Twin Lakes. (1011.) The fertile plant.
C. MARCIDA, Boott (!) in Hook., Fl. Bor. Am., 2, p. 212. Twin Lakes. Too young. (1012.)
C. STENOPHYLLA, Wahl., Act. Holm., 142, 1803. South Park. (1013;) also, (1014) and (1015) from same locality.
C. TENELLA, Schkr., 1801. Twin Lakes. (1016.)
C. CANESCENS, L., Fl. Suec., 842. Twin Lakes. (1017.) Also a var. approaching *C. helvola*, Blytt. (1018.)
C. SCIRPOIDES, Schk., in Willd., Sp. Pl., 4, 137, 1805. Twin Lakes. (1019.) I think this is distinct from *C. echinata*, Murr., which = C. STELLULATA, L.

C. FESTIVA, Dew., 29, 246, 1836. Mosquito. (1020.) Nos. 1021, 1022, and 1023 are probably the same, but too young to determine.
C. LEPORINA, L., Fl. Suec. Mosquito. (1024;) also, 1025, 1026, and 1027.
C. ALBOLUTESCENS, Schw., Anm., 66, 1824 = C. ADUSTA, Boott. Doubtfully referred here. Twin Lakes. (1028.)
C. ALBOLUTESCENS, Schw., var. minor, Boott. Branch of North Platte. (1029.)
C. LIDDONI, Boott, in Hook., Fl. Bor. Am., 2, p. 214, 1840. South Park. (1030;) also, (1031) too young.
C. JAMESII, Torr., Cyp., p. 398, 1836. Denver, South Park. 1032; also probably 1033.
C. STRICTA, Lam., = C. ANGUSTATA, Boott. South Park. (1034.) This would be more certainly determined if the specimens had lower sheathing leaves (too young).
C. RIGIDA, Good. Chihuaha Creek. (1035.) Doubtfully referred here (too young).
C. RIGIDA, Good., var. (1036.) Doubtfully referred here (too young).
C. PERSONATA, Fries. Twin Lakes, 1037 and 1038; South Pass, probably the same.
C. TURFOSA, Fries. South Pass. (1039.) Fries, Anderson, and Boott vary essentially in their descriptions of this species.
C. PARRAYANA, Dew., 27, 239, 1835. South Pass. (1040.) 1041, from Mosquito, the same. This species seems to have a fuller development farther north. I was inclined to refer a single spiked culm of Hall and Harbour's collection, from a very imperfect drawing of the periginium, to a new species, *C. Hallii;* but these specimens show no warrant for it.
C. BUXBAUMII, Wahl., Act. Holm. Twin Lakes. (1042.)
C. ALPINA, Swartz, 1792. South Park. (1043.)
C. ALPINA, Swartz, var. NIGRESCENS, Anderson. Twin Lakes. (1044.)
C. ALPINA, Swartz, var. (1045.)
C. ATRATA, L., Sp. Pl., 2, 1836, 1763. South Pass. (1046.)
C. ATRATA, L., var. NIGRA, Boott. Like Hall and Harbour's No. 587, so named by Dr. Boott. Oro Camp. (1047.)
C. ATRATA, L., var. Two specimens only. Twin Lakes. (1048.)
C. ATRATA L., var. OVATA, Rudge, = C. ATRATA, L., var. OVATA, Boott. Mosquito. (1049.) North Pass. (1050 and 1051.) These specimens are very luxuriant, with long spikelets of both colors, brown and glaucous green.
C. AUREA, Nutt., 2, 205, 1818. South Pass (1052, 1053, and 1054): also Twin Lakes (1055, 1056, and 1057), and varies from almost every locality.
C. ROSSII, Boott, in Hook., Fl. Bor. Am., 2, 222, 1840. Twin Lakes. (1058.) Very imperfect specimens.
C. CAPILLARIS, L., Fl. Suec., 338, 851, 1785. South Park. (1059.)
C. CAPILLARIS, L., var. ELONGATA, Olney, Dis. Twin Lakes. (1060.)
C. LANUGINOSA, Mx., 2, 175, 1803. Twin Lakes. (1061.) Several forms of this occur in the collection, one with androgynous terminal spikes; another with single fertile flowers below the terminal spike, representing spikelets; and another with narrow starved spikelets. (1062 and 1063.)
C. ACUTIFORMIS, Ehrh., = C. PALUDOSA, Good., in Linn., Trans., 2, 202. South Pass. (1064.)
C. ARISTATA, R. Br., in Fr. Narr., 764, 1823. Saguache. (1065.) 1066, 1067, probably the same; too young.
C. RHYNCOPHYSA, C. A. Meyer (?), = C. LÆVIROSTRIS, Blytt & Fries. Twin Lakes. (1068.)

C. UTRICULATA, Boott. Twin Lakes. (1069.) There are several numbers of the *Vesicariæ* group without ripe achenia, and hence unnamable.

C. SAXATILIS, L. = C. PULLA, Good. Twin Lakes.

C. SAXATILIS, L. = C. PULLA, Good. These differ slightly, the last with a more inflated perigynium; achenia of both nearly the same; both have two stigmas *most generally*. The perigynia of both have few nerves, and are so described by Lang and other European authors. 1070.

C. GRAHAMI, Boott., in Tr. Linn. Soc. (1071;) also, 1072. Both, as usual, without ripe achenia. The last has ovate perigynia rounded at the base.

GRAMINEÆ.

DETERMINED BY DR. GEO. VASEY.

ALOPECURUS ARISTULATUS, Michx. In ponds, Twin Lakes, Colorado. A form with delicate floating leaves; awn much shorter than the palet. (1073.) There are also other forms stouter, and with the awn one-half longer than the palet.

PHLEUM ALPINUM, L. Twin Lakes and South Park. (1074.)

VILFA CUSPIDATA, Torr. Dry ground, Twin Lakes. (1075.)

V. DEPAUPERATA, Torr.(?) South Park. (1076.)

V. MINIMA, *n. sp.* Culms erect, branched at the base, slender; spikes terminal and lateral, simple, few-flowered; lateral ones partly included in the sheaths; flowers alternate, half a line long, pointed; glumes membranaceous, obtuse, about half as long as the flowers; palets nearly equal in length; leaves mostly radical, short ($\frac{1}{4}$ to $\frac{1}{2}$ inch), strongly nerved, lower sheaths inflated. This diminutive grass appears to be annual, is from 1 to $1\frac{1}{2}$ inches high, slender and delicate, and was found growing on wet shores around Twin Lakes, Colorado. (1077.)

SPOROBOLUS CRYPTANDRUS, Gr. Ravines in Arkansas Valley. (1078.)

S. AIROIDES, Torr. Cottonwood Creek, Colorado. (1079.)

S. RAMULOSUS, H. B. K. Saguache Creek, Colorado. (1080.)

S. ASPERIFOLIUS, N. & M. Cottonwood Creek, Colorado. (1081.) A very luxuriant form occurs, in which many of the specimens have 2–3-flowered spikelets. Many of these have the grain affected with a black smut. In a bog, Saguache Creek. (1082.)

AGROSTIS SCABRA, Willd. Low ground, Twin Lakes, Colorado. (1083.) Dry beds of brooks, South Park. (1084.)

A. PERENNANS(?), Tuck. Wet ground among timber. (1085.)

A. EXARATA, Trin. (?) A small form. Twin Lakes. (1086.)

A. VULGARIS, With. Introduced(?). Roadsides. Twin Lakes. (1087.)

MUHLENBERGIA PUNGENS, Thurb. Fort Garland. (1088.)

M. GRACILIS, Trin. Twin Lakes. (1089.)

M. GRACILIS, var. BREVIARISTATA. Shorter and smaller, in more compact tufts; awns hardly half as long. Twin Lakes. (1090.)

M. GRACILLIMA, Torr. San Luis Valley. (1091.)

VASEYA COMATA, Thurb. Gravelly shores, Twin Lakes. (1092.)

CALAMAGROSTIS LANGSDORFFII, Trin. Wet ground, Twin Lakes. (1093.)

C. SYLVATICA, DC. Dry ground, Mosquito. (1094.) Also South Park. (1095.)

C. STRICTA, Trin. Twin Lakes (1096); and Saguache Creek (1097). Used for hay-making.

C. LAPPONICA, Trin. Mosquito. (1098.)
C. CONFINIS, Nutt. Low ground, Twin Lakes. (1099, 1100, 1101.) The seed is affected with an ergot (*Cladiceps*), which "differs from *Cladiceps purpurea* in its smaller size and in its color.—C. H. PECK."
ERIOCOMA CUSPIDATA, Nutt. Denver. (1102.)
STIPA SPARTEA, Trin. Twin Lakes. (1103.)
S. VIRIDULA, Trin. Twin Lakes. (1104.) Arkansas Valley. (1105.) Mosquito. (1106.) Alpine woods. (1107, 1108.)
S. MONGOLICA, Turcz. Wet ground, Twin Lakes; rare. (1109.)
ARISTIDA PURPUREA, Nutt., var. FENDLERI. Denver. (1110.)
SPARTINA GRACILIS, Trin. Saguache. (1111.)
BOUTELOUA HIRSUTA, Lag. Twin Lakes, Colorado. (1112.)
B. OLIGOSTACHYA, Torr. Twin Lakes. (1113.) Grant Creek, Colorado. (1114.) This is the gramma-grass of the plains and of Texas.
BUCHLOE DACTYLOIDES, Eng. Summit. (1115.) The celebrated buffalo-grass.
GRAPHEPHORUM FLEXUOSUM, Thurb. Fort Garland, Colorado. (1116.)
KŒLERIA CRISTATA, Pers. Twin Lakes. (1117, 1118.)
GLYCERIA AQUATICA, Sm. Saguache Creek. (1119.)
G. AIROIDES, Thurb. Saguache Creek. (1120.)
G. NERVATA, Trin. Twin Lakes. (1121.)
CATABROSA AQUATICA, Beau. Near Gray's Peak. (1122.)
BRIZOPHYRUM SPICATUM, Hook. Saguache Creek. (1123, 1124.)

The Poas of the Rocky Mountains are in much confusion as to names. Some of those given herewith are open to doubt, but they indicate, apparently, good and distinct species.

POA PRATENSIS, L. Subalpine; apparently identical with our cultivated plant. Colorado. (1125.)
P. ALPINA, L. Wet ground, Mosquito. (1126.) Also alpine streams, South Park. (1127. These are mostly the var. *minor*, Gaud & Hoppe, with short, broad, and somewhat rigid leaves, culms 4 to 12 inches high, and rays single or in pairs.
P. LAXA, Haenk. A form with narrower leaves than the preceding; panicle with more numerous and longer branches. South Park. (1128.)
P. CÆSIA, Sm.(?) A large form, 2 feet high, panicle 6 inches long, with long, capillary, scabrous branches (3 to 4 inches), erectish, or slightly spreading, and with sometimes a long subradical branch. Dry alpine woods, Twin Lakes. (1129.)
P. SEROTINA, Ehrh. Panicle longer and narrower than the preceding. Dry ground, Twin Lakes. (1130.)
P. NEMORALIS, L.(?) Culms tall (2 to 3 feet) and slender, smooth above, somewhat scabrous below, with only 2 or 3 linear short leaves (6 inches); panicle 6 to 8 inches long, narrow; branches in fives, capillary, and spreading. Scattering in alpine bogs, Twin Lakes.
P. WHEELERI, *n. sp.* Radical leaves rigid, involute and cuspidate-pointed, 5 to 10 inches long; culms from running root-stocks like *P. brevifolia*, Muhl., and having a panicle much like that, with capillary branches in pairs; flowers acute, not webbed. In timber, South Park. (1131.)
P. FLEXUOSA, Muhl. (?) Identical with Mr. Watson's No. 1316 in the collection of King's Explorations, but different from the eastern plant. Culms from 2 to 3 feet high, pale green; panicle large, spreading; rays long, in twos or threes; flowers and glumes acute. Apex, Col. (1132.)
P. ———. This is the plant described doubtfully as *P. alpina*, var., by

Mr. Watson in the Botany of the Fortieth Parallel, No. 1312, but it appears to be wholly different from that species. It probably belongs to the section *Schlerochloa*. Apex, Col. (1133 and 1134.)

P. ANDINA, Nutt. Several varieties are classed under this species. Some of them approach very closely to the preceding. North Platte. (1135.) South Park. (1136.) Branch of Green River. (1137.)

P. TENUIFOLIA, Nutt. This species is quite variable, and possibly there are two species called by this name. South Park. (1138.) Twin Lakes (1139 and 1140), a form with slender wiry stems, and long linear panicle. Apex, Col. (1141) stouter, broader panicle, and larger flowers.

P. ———. A form of the *Cæsia* section, growing in dense tufts, with short, wiry stems; short, narrow leaves, short and narrow panicle, and purple flowers. Mosquito. (1142.) South Park. (1143.)

P. ARCTICA, R. Br. Along mountain-streams, Twin Lakes (1144); also Mosquito (1145).

ERAGROSTIS PILOSA, Beau. Saguache Creek. (1146.)

FESTUCA TENELLA, Willd. Denver, Col. (1147.)

F. MICROSTACHYS, Nutt. (?) South Park. (1148.) Awns equaling or exceeding the palet.

F. OVINA, L. (1149.) Near the eastern form.

F. OVINA, L., var. DURIUSCULA. Twin Lakes. (1150.)

F. OVINA, L., var. TENUIFOLIA. South Park. (1151.)

F. BREVIFOLIA, Br. (F. OVINA, var. BREVIFOLIA, Watson.) Summit of Mount Lincoln. (1152.)

F. SCABRELLA, Hook. (?) Twin Lakes. (1153.)

F. THURBERI, *n. sp.*, No. 1154. Culms erect, 1½ to 2 feet high, leafy, leaves exceeding the internodes and the upper one overtopping the panicle; panicle 3 to 4 inches long, a little drooping; lower part inclosed in the upper sheath; branches slender, single or in pairs, naked below, erect; spikelets cylindrical, lanceolate, acute, 3–5-flowered, 5 to 6 lines long; glumes membranaceous, shorter than the flowers, nearly equal; lower one convex; not compressed, inner one slightly keeled, purplish, obscurely nerved; lower palet lanceolate, acute, or short cuspidate, minutely scabrous, obscurely 5-nerved, convex; inner palet nearly equaling the outer, narrow, slightly hispid on the keels; radical leaves numerous, involute, 6 to 12 inches long, rough, margined.

BROMUS KALMII, Gr., var. (?) Twin Lakes. (1155, 1156.)

B. CILIATUS, Gr., var. (?) Twin Lakes. (1157.)

B. CILIATUS, var. COLORADENSIS, near Gray's Peak. (1158, 1159.) This has been called *B. breriaristatus*, Hook., but is evidently not that plant.

ELYMUS CONDENSATUS, Presl. Grant Creek. (1160.) Twin Lakes.

E. SITANION, Schultz. (SITANION ELYMOIDES, Raf.) Several forms. Denver. (1161.) Twin Lakes. (1162.) South Park. (1163.)

HORDEUM JUBATUM, L. Saguache, Colorado, low grounds. (1164.)

H. PRATENSE, Huds. South Park. Mosquito. (1165.)

TRITICUM REPENS, L. Twin Lakes. Mosquito. (1166.)

T. REPENS, var. with awned flowers. Cottonwood Creek. (1167.)

T. VIOLACEUM, Horn. Twin Lakes. (1168.)

T. CANINUM, L. Twin Lakes. (1169.)

DANTHONIA SERICEA, Nutt. Twin Lakes. (1170.) South Park. (1171), with a smaller form, which is perhaps *D. spicata*.

TRISETUM SUBSPICATUM, Beauv. North Pass. (1172.) Baker's Mine. (1173.)

T. ALPESTRE, Beauv. Twin Lakes. (1174.) The panicle is quite open and expanded, and corresponds well with European specimens of *T. alpestre.*

T. WOLFII, *n. sp.* Apparently cæspitose, and from a running root-stock; culms erect, 1 to 1½ feet high, smooth; culm-leaves short, 2 to 4 inches; lower leaves and sheaths somewhat scabrous; ligule lacerate; flowers in an upright, close panicle, which is 2 to 4 inches long, 1 to 2 rays at each joint; spikelets lanceolate, 2-flowered, and with a rudiment or continuation of the rachis half as long as the uppor flower; the rachis and rudiment villous hairy; glumes lanceolate, membranaceous, acuminate, equaling the flowers, which have a few hairs at the base; lower palet lanceolate, acuminate, slightly split or 2-toothed at the apex, obscurely 5-nerved, bearing near the point a straight appressed awn, which extends to the apex of the palet, or a little beyond it; upper palet shorter; grain oblong or linear, nearly as long as the palets. Collected at Twin Lakes, Colorado. A very similar, if not identical, species was collected in the Rocky Mountains in 1868 on the expedition of Major Powell, and distributed as No. 693 of Vasey's collection. This species might easily be mistaken for *Graphephorum melicoides*, but a close examination discovers the short awn on the back of the palet. Butsome specimens of *G. melicoides* from near Mount Kineo, Maine, also possess a short awn, though shorter than these Rocky Mountain specimens. Other specimens of *G. melicoides* from Canada fail to show any awn. The question arises whether these short-awned specimens should be considered as belonging to *Graphephorum* or *Trisetum*. This species is dedicated to its discoverer, Mr. John Wolfe, of Illinois.

AIRA CÆSPITOSA, L. South Park. Twin Lakes. (1175.) Some of the specimens have awns exceeding the palets.

HIEROCHLOA BOREALIS, R. & S. South Park. (1176.)

BECKMANNIA ERUCÆFORMIS, Host. Saguache Creek. (1177.)

LEPTURUS PANICULATUS, Nutt. Denver. (1178.)

The collection of grasses above catalogued is probably the largest and completest ever made in the mountains of Colorado, and does great credit to the keen and experienced eye of Mr. John Wolfe, the collector.

The greater part of the species are well known to science, but a few are new, and others are collected in such fullness as to render more satisfactory our knowledge of some difficult genera, especially of the genus *Poa*. A number of the forms in this genus I have indicated without names, from the difficulty of obtaining definite information respecting them. Probably a competent revision of the genus will require the formation of some new species.

In an agricultural point of view, the grasses of this region deserve careful study. Some species, which have long been noted for their nutritious qualities, will probably not be able to hold their ground before the advance of settlements, as the buffalo-grass (*Buchloe dactyloides*) is said to be gradually disappearing. Many different species are popularly known as bunch-grass, the principal of which are probably *Eriocoma*, *Festuca*, and one or two species of *Poa*. Probably some of the species of *Poa* will yet be found as well adapted to cultivation on the plains as the *Poa pratensis* is for cultivation in the Eastern States.

GEO. VASEY.

EQUISETACEÆ.*

EQUISETUM LÆVIGATUM, Al. Braun. (991.) Denver.

FILICES.

POLYPODIUM VULGARE, L. Dwarfed specimens. Common in rocky places. (992.)
CRYPTOGRAMME ACROSTICHOIDES, Bd. Twin Lakes; altitude, 11,000 feet. (993.)
CYSTOPTERIS FRAGILIS, Bernh. Common everywhere. (994.)
NOTHOLÆNA FENDLERI, Kunze. Rocky banks about Loma (on the Rio Grande.) (995.)
WOODSIA OREGANA, D. C. Eaton. Twin Lakes. (996.)
PELLÆA BREWERI, D. C. Eaton. Loma.

LYCOPODIACEÆ.

LYCOPODIUM SELAGO, L. Twin Lakes. (998.)
L. ANNOTINUM, L. Half-Moon Creek; altitude, 11,000 feet. (999.)
SELAGINELLA RUPESTRIS, Spring. Altitude, 10,000 feet and upward. (997.)

HYDROPTERIDES.

MARSILIA VESTITA, Hook. & Grev.

MUSCI.

BY THOMAS P. JAMES, CAMBRIDGE, MASS.

SPHAGNUM ACUTIFOLIUM, Ehrh.
Hab.—Twin Lakes; in bogs.
SPHAGNUM CUSPIDATUM, var. RECURVUM.
Hab.—Twin Lakes in bogs.
WEISIA CRISPULA, Hedw.
Hab.—Twin Lakes; in mountainous districts on rocks.
GYMNOSTOMUM RUPESTRE, Schwg.
Hab.—Twin Lakes; on damp clay soil.
CYNODONTIUM VIRENS, Hdw.
Hab.—Twin Lakes; on moist ground.
CYNODONTIUM VIRENS, var. SERRATUM.
Hab.—Twin Lakes; on old bogs.
POTTIA HEIMII, Hdw.
Hab.—Twin Lakes; on the ground.
DESMATODON LATIFOLIUS, Hdw.
Hab.—South Park; along streams.
DESMATODON LAURERI, Schts.
Hab.—Twin Lakes; on damp rocks.
DESMATODON LAURERI, var.(?)
Hab.—Twin Lakes; on the ground.
DIDYMODON RUBELLUS, Bry. Eur.
Hab.—Twin Lakes; on wet banks.

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* For the identification of the *Filices*, *Equisetaceæ*, and *Lycopodiaceæ*, I am unde obligations to Prof. D. C. Eaton, of Yale College.—J. T. R.

BARBULA SUBULATA, Brid.
Hab.—Twin Lakes; on rocks.
BARBULA SUBULATA, var. SUBINERMIS.
Hab.—Twin Lakes; on rocks.
BARBULA RURALIS, Hedw.
Hab.—Common on mountain-sides; on rocks.
CERATODON PURPUREUS, Brd.
Hab.—Twin Lakes; common on rocks, &c.
CERATODON PURPUREUS, var.
Hab.—Same situations.
CERATODON PURPUREUS, var. COMPACTUM.
Hab.—Twin Lakes; in boggy ground.
DISTICHIUM CAPILLACEUM, Bry. Eur.
Hab.—Twin Lakes; on wet rocks.
DISTICHIUM CAPILLACEUM, var. BREVIFOLIUM.
Hab.—South Park; in low wet grassy ground.
DISTICHIUM INCLINATUM, Swtz., Br. & Sch.
Hab.—In similar situations.
ENCALYPTA CILIATA, Edw.
Hab.—Twin Lakes; on rocks and shaded ground.
ENCALYPTA RHABDOCARPA, var. *Foliis papillosis piliferis, capsula striata, apophysata, peristoma nullo.*
Hab.—Twin Lakes; under shelving rocks.
ORTHOTRICHUM TEXANUM, Sulliv.
Hab.—Twin Lakes; on shaded rocks.
ORTHOTRICHUM TENELLUM, Brch.
Hab.—Twin Lakes; on rocks.
ORTHOTRICHUM SPECIOSUM, Nees.
Hab.—Twin Lakes; on rocks.
ORTHOTRICHUM RUPESTRE, Schl.
Hab.—In like situations.
GRIMMIA APOCARPA, Hedw.
Hab.—Common under rocks.
GRIMMIA PLATYPHYLLA, Mitt.
Hab.—Twin Lakes; on dry rocks.
GRIMMIA ANODON, Br. & Sch.
Hab.—Twin Lakes; on dry rocks.
GRIMMIA OVATA, Web. & Mhr.
Hab.—Twin Lakes; on dry rocks.
GRIMMIA OVATA, var. *β.* AFFINIS, B. & S.
Hab.—In similar places.
GRIMMIA CALYPTRATA, Hook.
Hab.—Twin Lakes; on rocks.
HEDWIGIA CILIATA, var. LEUCOPHÆA, B. & S.
Hab.—Twin Lakes; on exposed rocks.
TAYLORIA SPLACHNOIDES, Hook.
Hab.—Twin Lakes; damp situations shaded by rocks.
PHYSCOMITRIUM LATIFOLIUM, Brid.
Hab.—Twin Lakes; growing with *Aphanorrhegma.*
FUNARIA HYGROMETRICA, Hdw.
Hab.—On the ground; common.
APHANORRHEGMA SERRATA, Sulliv.
Hab.—Twin Lakes; on the bare surface of the soil.
LEPTOBRYUM PYRIFORME, Schp.
Hab.—Twin Lakes; in wet places under shade.

WEBERA ELONGATA, Dks., Schwg.
Hab.—In crevices of rocks in the shade.
WEBERA ELONGATA, var. HUMILIS, B. & S.
Hab.—In similar localities.
WEBERA NUTANS, Schrad.
Hab.—Twin Lakes; on shaded ground.
WEBERA NUTANS, var. β CÆSPITOSA, Br. & Sch.
Hab.—Twin Lakes; in bogs.
WEBERA NUTANS, var. γ BICOLOR, Br. & Sch.
Hab.—Twin Lakes; at base of trees in open woods.
WEBERA NUTANS, var. LONGISETA, B. & S.
Hab.—Twin Lakes; at base of trees.
WEBERA SUBDENTICULATA, B. & S.
Hab.—Twin Lakes; on rotten logs.
AMBLYODON DEALBATUS, Dks., Beau.
Hab.—South Park; on wet ground.
ZIERIA DEMISSA, Hk., Schp.
Hab.—Twin Lakes; in crevices of rocks.
BRYUM ULIGINOSUM, Br. & Schl.
Hab.—On wet, shaded grounds.
BRYUM PENDULUM, Hsch. & Schp.
Hab.—Twin Lakes; on low ground.
BRYUM PENDULUM, var. *Antheridia sola in gemma diversa inclusa.*
Hab.—In similar localities.
BRYUM INTERMEDIUM, Wbr. & Mhr.
Hab.—Twin Lakes; on moist rocks.
BRYUM CIRRHATUM, Hp. & Hsch.
Hab.—South Park; on low ground.
BRYUM PALLESCENS, Schwg.
Hab.—South Park; on damp ground.
BRYUM PALLESCENS, var. γ CONTEXTUM.
Hab.—South Park; on low boggy ground.
BRYUM PALLESCENS, var. HERMAPHRODITUM.
Hab.—South Park; on moist ground.
BRYUM CÆSPITICIUM, Linn.
Hab.—South Park; in fissures of dry rocks.
BRYUM ARGENTEUM, Linn.
Hab.—Twin Lakes; in dry exposed situations.
BRYUM OBCONICUM, Hsch.
Hab.—Twin Lakes; on the ground.
BRYUM PSEUDO-TRIQUETRUM, Hedw.
Hab.—Twin Lakes; in wet situations.
BRYUM PSEUDO-TRIQUETRUM, var. COMPACTUM.
Hab.—Twin Lakes; in bogs.
BRYUM TURBINATUM, Hedw.
Hab.—Twin Lakes; on moist ground.
BRYUM TURBINATUM, var. LATIFOLIUM, B. & S.
Hab.—Similar localities.
MNIUM AFFINE, var. ELATUM, B. & S.
Hab.—Twin Lakes; under shade in wet places.
MNIUM SERRATUM, Brid.
Hab.—Twin Lakes; by the side of shaded rocks.
AULACOMNION PALUSTRE, Schwg.
Hab—Twin Lakes; common on bogs.
MEESIA ULIGINOSA, Hedw.
Hab.—Twin Lakes; wet, boggy ground.

PHILONOTIS MARCHICA, Roth.
Hab.—Twin Lakes; in springy places.
PHILONOTIS FONTANA, Linn., Brid.
Hab.—Twin Lakes; side of brooks.
PHILONOTIS CALCAREA, Br. & Sch.
Hab.—Twin Lakes; by the side of small runs.
TIMMIA MEGAPOLITANA, Hedw.
Hab.—Twin Lakes; shaded rocky ground.
POLYTRICHUM JUNIPERINUM, Hedw.
Hab.—Twin Lakes; on moist ground.
CLIMACIUM AMERICANUM, Brid.
Hab.—Bogs in meadows; common.
PSEUDOLESKEA ATRO-VIRENS, Dks.
Hab.—Twin Lakes; on the ground in woods.
THUIDIUM BLANDOWII, Web. & Mhr.
Hab.—Twin Lakes; in wet places.
ELODIUM PALUDOSUM, Sulliv.
Hab.—Twin Lakes; in boggy situation.
EURHYNCHIUM STRIGOSUM, Hffm.
Hab.—Twin Lakes; by the roots of trees in woods.
BRACHYTHECIUM RIVULARE, Br. & Sch., var.
Hab.—Twin Lakes; along the banks of rivulets.
BRACHYTHECIUM COLLINUM, Schl.
Hab.—Twin Lakes; on the banks of creeks.
BRACHYTHECIUM SALEBROSUM, Hffm.
Hab.—Twin Lakes; on wet ground.
MYURELLA JULACEA, Sch.
Hab.—Twin Lakes; on wet banks of streams.
AMBLYSTEGIUM SPRUCEI, Brch.
Hab.—Twin Lakes; in moist places.
AMBLYSTEGIUM SERPENS, Sch.
Hab.—Twin Lakes; on old logs and wet ground.
AMBLYSTEGIUM RADICALE, P. Beau.
Hab.—Twin Lakes; on wet ground.
LIMNOBIUM PALUSTRE, Linn., Sch.
Hab.—Twin Lakes; at the base of trees at the water's edge.
LIMNOBIUM PALUSTRE, var.
Hab.—Similar localities.
LIMNOBIUM OCHRACEUM, Turn.
Hab.—Twin Lakes; on wet ground.
HYPNUM STELLATUM, Schrb.
Hab.—In damp situations, shaded.
HYPNUM PLICATILIS, Nutt.
Hab.—Twin Lakes; on old logs.
HYPNUM COMPLEXUS, Mitt.(?)
Hab.—Twin Lakes; on shaded rocks.
HYPNUM UNCINATUM, Hedw.
Hab.—Twin Lakes; on wet ground.
HYPNUM ADUNCUM, Hedw.
Hab.—Twin Lakes; on banks of running water.
HYPNUM ADUNCUM, var. β GRACILESCENS, B. & S.
Hab.—Twin Lakes; damp, shady ground.
HYPNUM ADUNCUM, var. ε *tenue*, B. & S.
Hab.—Similar places.
HYPNUM ADUNCUM, var. *giganteum*, B. & S.
Hab.—Twin Lakes; in standing water.

HYPNUM COMMUTATUM, Hedw.
Hab.—Twin Lakes; in wet situations.
HYPNUM COMMUTATUM, Hedw., var. FALCATUM.
Hab.—In similar localities.
HYPNUM FILICINUM, Linn.
Hab.—Twin Lakes; along the banks of streamlets.
CAMPTOTHECIUM NITENS, Sch.
Hab.—Twin Lakes; among grass in meadow.

HEPATICÆ.

BY C. F. AUSTIN.

RICCIA FROSTII, Austin.
RICCIA WATSONII, Austin.
RICCIA CRYSTALLINA, Linn.
RICCIA FLUITANS, var. LATA.
MARCHANTIA POLYMORPHA, Linn.
CHILOSCYPHUS POLYANTHOS, var. RIVULARIS.
JUNGERMANNIA BICUSPIDATA, Linn.
JUNGERMANNIA INCISA, Schd.
JUNGERMANNIA HORNSCHUSCHIANA, Nees.
JUNGERMANNIA MÜLLERI, Nees.
JUNGERMANNIA CORDIFOLIA, Hsch.
JUNGERMANNIA VENTRICOSA, Dks.
SCAPANIA COMPACTA, Roth.
SCAPANIA UNDULATA, Nees.
SCAPANIA ULIGINOSA, Swartz & Nees.

A large number of lichens are still to be named, which will be done in the next report.

Some few new species of phænogams were found in the collection, and also many well known species not hitherto found in Colorado.